

A N
E N Q U I R Y

A F T E R

PHILOSOPHY and THEOLOGY.

TENDING TO SHOW,

WHEN and WHENCE Mankind
came at the knowledge of these
two important points.

The SECOND EDITION.

By ROBERT SPEARMAN.

D U B L I N.

Printed for WILLIAM WATSON, at the *Poets*
Heads in *Capel-street*, MDCCLVII.

Ph.D.

ENQUIRY

AFTER

PHILOSOPHY AND THEOLOGY.



SECOND

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ROBERT SPERMAN.

D. D. A. A. A.

Printed by William Watson, of the City
of London, in Great Britain.

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Handwritten signature or initials

DEDICATION.

~~and Edition to your learned and~~

~~respectable Body.~~

For

TO THE

PROVOST, FELLOWS,

AND

Young Gentlemen STUDENTS,

OF THE

University of DUBLIN.

GENTLEMEN,

THE First Edition of the following Treatise, printed at *Edinburgh* without my Name, having met with so favourable a Reception in your Kingdom, as to encourage Mr. *Watson* to reprint it; I most readily embrace the Opportunity of addressing this second

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cond Edition to your learned and respectable Body.

It is called *An Enquiry after Philosophy and Theology*, and I trust it will also be found an Enquiry into these two interesting Points; which in their full Extent comprehend all that can be the Object of the Understanding, and in a more limited Sense all that is worth the Attention of Mankind: And accordingly they have been Matter of Enquiry and Controversy among the learned and inquisitive of all Ages. I have presumed to re-examine, and even to call in Question the Tenets of a late celebrated Philosopher of our own Nation, who has long been held in the greatest Veneration.-----A Presumption, which nothing but a Regard to Truth, and it's divine Fountain can excuse or justify. *Amicus Socrates, amicus Plato, sed magis amica Veritas*, and I hope a Plea, allowed

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ed an Heathen, will not be denied to a Christian. I have also offered another Philosophy in the Stead of that called in Question,----but then it is the Philosophy of Scripture; and I may presume that no Friend to Revelation can take just Offence at my preferring the Physics of *Moses* to those of Sir *Isaac Newton*.

I have concerned myself with Theology no further than to shew the inseparable Connection between *it* and Philosophy, which holds out to us the Glafs in which alone we can glimpse the Glory of *Jehovah* εν Αιγιματι. For the human Understanding is indebted to the Senses for all it's Ideas, and can never exceed the Limits God has set it: And therefore it is through this Veil of Nature that the Face of God must be seen, his Glory being too bright for human Eyes to behold without such a Covering. And we find by dread-

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ful Experience that the exchanging the fluid Medium of the Heavens for an imaginary Vacuum, and supposing that the Eye, which can only see through this Medium, is capable of seeing by a Light in itself, have almost destroyed the Book of Nature to all the Uses of Instruction, and introduced in Divinity a chimerical Extension for God, whose very Immenfity limits him, and who has nothing left for him to do, but to fill the Space the Philosopher has created for him. This Wisdom needs not the Instruction of the Word of God, and leaves no Room for a Christ ; and deprives us of the Use of our Reason under the Pretence of a mighty Zeal for it. While *Nature* and *the Light of Nature*, those pretended Friends and Allies of Revelation, like *Party-words* in the Mouths of Rebels, mean the very Reverse of themselves, and are only
used

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used to mask Designs which it is not quite Time openly to avow.

It is a very momentous Truth, now generally received, Thanks to two learned and pious Dignitaries of your Nation, that our Ideas are not innate, but arise wholly from Sensation ; That Divine Things are known by Analogy with natural ; and that Revelation, not Reason, is the Fountain of all Theological Knowledge. The Importance of this Truth is greater by much than was at first apprehended : And had *it*, and the Plan of interpreting the sacred Scripture, pointed out in these Sheets, been properly urged by the true Christian, they would have deprived the *Irish* House of Lords of the glorious Opportunity of exerting their truly Christian Zeal upon a late memorable Occasion. Which I should not have taken the Liberty to mention, did it not reflect the highest Honour upon
your

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your Kingdom. But I beg leave to refer you to the Book itself, which with all decent Humility is recommended to the Learned, the PRO-
VOST, and FELLOWS of the University of *Dublin*, and if it meet with their Approbation, to the younger Students. I have laid before them some Things which may be new to many, or at least, have not been so fully considered, as their great Influence on the principal Articles of Religion (which some are at present so treacherously undermining) deserve. And I hope the Manner in which I have done it, cannot give any just Cause of Offence; having endeavoured to keep clear of all Asperity of Language---making Truth, not Persons, my Aim, and not seeking my own, but the Glory of God, and his Holy Word, which is an inexhaustible Treasure of all Learning and Knowledge.

I have

DEDICATION.

I have not concealed the Author to whom I stand indebted for my Materials; and if my well-meant Endeavours should prove so successful as to recommend that Author to your Regard and Use, so far as to encourage Mr. *Watson* to re-print his Works, I will (if God preserve my Life and Health) most willingly and chearfully do my utmost to present the University of *Dublin* with a correct Edition. And I doubt not but my Friend and Brother Editor, the Reverend and worthy Mr. *Julius Bate* will join with me in so laudable an Undertaking. I am with the highest Esteem and Respect,

GENTLEMEN,

Your most Obedient

Humble Servant.

*Oldacres in the County of Durham, 24
June 1757.*

ROBERT SPEARMAN.

DEDICATION

I have not concealed the Author to whom I stand indebted for my Materials; and if my well-meant Endeavours should prove to succeed, I feel as to recommend that Author to your Regard and Use, so far as to encourage Mr. Walker to re-print his Works, I will (if God preserve my Life and Health) most willingly and cheerfully do my utmost to present the University of Dublin with a correct Edition. And I doubt not but my Friend and Brother Editor, the Reverend and worthy Mr. Jones, will join with me in so laudable an Undertaking. I am with the highest Esteem and Respect,

12 JUL 26

GENTLEMEN,

Your most Obedient

Humble Servant,

Obdient in the Conn-
ty of Down, &c.
Jas 1757.

ROBERT STEARMAN

A N
E N Q U I R Y

A F T E R
Philosophy and Theology.

I N T R O D U C T I O N .

EVERY man, learned or unlearned, has a philosophy ; and every man has a God ; and as, now-a-days, they are generally of his own manufacture, they vary according to the imagination of the maker. It is impossible all the different opinions of mankind concerning these two important points should be true ; yet self-love naturally prejudices each man in favour of his own, and the thirst of fame induces him to proselyte as many as he can, to the same way of thinking. Hence it is, that every village has its wiseman, who dictates as philosopher and divine, gains his circle of admirers,
B and

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and like Cato gives laws to his little senate, Though no writings or pompous monuments perpetuate his name to posterity, yet he lives in the memory of his own contemporaries ; and tradition hands him down the Descartes or Newton of his age.

When a man of genius and learning takes it into his head to imagine what nature and God must be, his ambition prompts him to print. He garnishes out his notions with all the embellishments of style, and seasons them to the prevailing taste of the age. If they happen to meet with a general run of credit, whether by the interest of some men in power, or the mere caprice of the times, no matter which, they then soon become fashionable ; for there is a mode in opinions as well as in dress. In this case the man's fame is established. He is made master of the mint of notions for his life ; and whatever comes coined from his hands, passes for current. He lives the hero of his age, and is deified at his death ; his writings become the standard and test of our faith, both in philosophy and theology, till some other aspiring fellow starts up, invents a more plausible story, or the natural fickleness and giddiness of mankind, prone to novelty, receive it as such. The last and present age afford us two notable instances of the truth of this observation ; I mean

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Monf. Descartes and Sir Ifaac Newton. The works of the former sharing the fate of their author, lie buried in duft and oblivion; while thofe of the latter are fresh as his monument, and in the opinion of his admirers will laft as long.

This defire, fo ftrongly implanted in the mind of man, to know nature and its author, makes it highly reasonable to believe, that either God has given man a faculty, whereby he may attain a fatisfactory knowledge of the Creator, and his works; or otherwife, that he has been pleafed, in fome manner or other, to make a revelation of this fo much wanted, fo much defired knowledge. That man is poffeffed of no fuch faculty, feems probable from this, that, by what is handed down to us, none of the ancients could either frame a ftory concerning thefe matters, which would bear the telling, or agree in telling it; which they certainly might have done, if fuch knowledge was attainable by natural abilities. Their method in the fearch of thefe truths plainly fhews they never dreamed of any fuch thing; for they ran about from place to place, to pick up what blind accounts they could from tradition, and from the hieroglyphical representations preferved in the temples of their gods; which, had they had this knowledge fo nigh home, as with-

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in themselves, might have saved them the trouble of going so far abroad.

As, by their manner of enquiring, they appear to have had no notion of any such innate knowledge, so by the fruit of their enquiries we may be satisfied they had it not. Their accounts are all equally inconsistent; all equally short of the truth.

If man, by searching, could find out the Almighty and his works to perfection, we might have expected, before this, to have had one perfect uniform scheme of philosophy and divinity, which the wisemen of all ages had agreed to, and received as truth. In fact, we find no such system; each being destructive of, and built upon the ruins of the other. How this should come to pass, if these are matters discoverable by reason and the light of nature, has not been duly considered, nor satisfactorily solved, by those, who, with so much confidence, assert the affirmative.

For a particular genius to rise up, and give the world the light it has wanted, in points of such universal import, more than these five thousand years, for any thing appears to the contrary; supposing, at the same time, reason and the light of nature sufficient for the discoveries; is an hypothesis

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sis which looks more like inspiration, or a certain revelation made to a particular favourite of Heaven, than a natural faculty implanted in the minds of all men, improveable by study; and when so improved, capable of the highest discoveries, both of things in this and in another state.

Reason, and the light of nature, as they are common to all men, though not in the same degree, if they are to be the guide of our actions, the test of our faith in all matters here, and the rule whereby we are to be tried or judged hereafter, should shine so strong and clear in each individual, as to be able, if not to discover, at least to see and approve the truth when so discovered; otherwise they would not be of any benefit to mankind, nor answer, to man, the design and end for which they were given. If the perfect knowledge of nature and its author was never discovered till these our present happy times, how came this common light of reason to shoot so faint and glimmering a ray, as never before to make the discovery? If these points were known before, when, and by what means, was this knowledge lost, and by what fate happened it, that the same means could never, before now, make the same discoveries? For it seems to be an event the most surprising, and the least to be accounted for from the

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nature of things, that reason, the only and all-sufficient means to attain to these discoveries, given to man for this very end, should, for so many ages, be in vain racked and tortured in the inquisition of these truths; and yet, after so long a time as five thousand years, reason should stumble upon them, as it were, by chance: since the enquirers of all ages had the same powers and faculties of reasoning, the same light of nature to direct and assist them; and many of them spared no time or pains to complete and perfect their enquiries. Reason has had a long infancy, if it be but now arrived at its manhood; and the world, in general, has reaped but little benefit from its light, if, like an *ignis fatuus*, it has thus shone in holes and corners, by fits and starts. The objection urged by reasoners against the Christian dispensation, will here recur in its full force: for the world, upon their supposition, must have lain long buried in darkness. The reason of former ages was dim and obscure, and their knowledge confined, and hidden in mysteries, and their *religion of nature* comes too late delineated, and, I think I may say, attended with too slender evidence, to be received for the *catholic faith*. Besides, it is confined to an handful of men, in a small corner of the world; the far greater part of mankind, if they have this light within, being no better for it, its rays not shining

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shining strong enough to dispel and dissipate the thick gloom of superstition and ignorance which hangs over them; so can never, as the reasoners would pretend, be the true light which lighteth every man which cometh into the world. For my own part, I can have no great veneration for the sufficiency of reason, which in so many thousand years could not find out what now every smatterer in philosophy and divinity pretends to know, and to demonstrate to a mathematic certainty.

I come next to enquire what grounds we have to believe a revelation was made in these points. I presume it will readily be granted me, that no writings extant carry any marks of, or have any just pretences to a divine revelation, except those of the *Old and New Testament*; and if we find it not *there*, it is in vain to seek for it *any where beside*. It will, I hope, also be allowed me, that these writings come handed down to us with sufficient authority to inforce the belief of what they contain; since the objections generally raised, are not upon the supposition of the books being forged, but are fixed on the seeming mistakes and contradictions in things natural and divine, which the objectors cannot reconcile to what they have set up as the standard of truth and right reason. We find it revealed,

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Gen. i. 1. that *God created the heavens and the earth* ; and a formal account of the creation is there particularly related. But, according to the opinion of our learned men, *God* is an insignificant word, and the account of the creation there given is false ; so that every one is still left at his liberty to frame what notions he pleases of the divine essence, and to lay down his own laws for the laws of nature ; to define, from his own imaginations, the attributes of God ; and give, I know not what, properties to matter. We are as much in the dark about these important points, as if nothing had been revealed ; and yet it should seem, at first sight, as if revelation was given to set us right in each of them. That Moses, the legislator of the Hebrews, and a prophet of God, should introduce his laws with a false account of the creation and formation of things ; and that the God of truth should allow, much less inspire, his servant to hand down to posterity a formal untruth, is repugnant to common sense, and sounds harsh to a Christian ear : yet what less does every one say in his heart, who denies the Mosaic philosophy to be true !

If Moses accommodated his account of natural things *ad captum vulgi*, and if the Jews were so carnal a people as supposed, might he not do the same with regard to spirituals ?

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spirituals ? So that this supposition, of writing *ad captum vulgi*, in quitting him of one objection, lays him open to another, *viz.* That if he conformed or adapted his account to their conception of nature, he might do the like in respect to God. And if so, it is to no purpose to look for either sound philosophy or divinity in his writings. But I shall be told, That God, by his revelation, did not intend to instruct men in philosophy, but in faith and obedience. To which I answer, in the *first* place, That this is *gratis dictum*. *2dly*, That if this had really been the case, revelation would have been confined to these points solely, or at least chiefly, and not have so largely and frequently intermixed philosophy with them ; so that if all the places of the scripture which treat of, or relate to philosophical subjects, were collected together, they would make one half or near two thirds of the Bible. Besides, when God was rectifying the errors of their conceits with regard to his nature and worship, and giving them a compleat ritual to preserve them in the true faith and worship, would he let them remain in all their errors and false opinions with regard to Nature and her operations ? nay, stamp them with his authority, by treating of them in the same idle manner men were at that time wont to conceive of them ? This is to make the Holy Ghost lye unto man. And if the
inspired

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inspired writers of the books of the Old Testament understood the real nature of things, and their true causes, as it is expressly asserted of Solomon ; then, by this supposition, did the Holy Ghost over-rule these penmen to suppress their own real knowledge of nature, and to transmit down to posterity under their hands what they knew to be false. To such strange absurdities does this opinion drive its fautors. Nay, some have supposed the same of the divinity of Moses as of his philosophy ; and tell us, that God condescended to the level of the capacities of the carnal Jews in the Mosaic ritual, and having picked up all the absurdities of worship to which they had been used in their conversation with the idolatrous nations, omitting only the doctrine of a future state, collected them into a body of laws, and made his holy and tremendous name, *I am Jehovah your Aleim*, their sanction. So that what I observed just above, must be the direct consequence of what Maimonides among the Jewish writers, and Dr. Spencer, and others, among the Christian, have laid down, namely, That neither true philosophy nor true divinity is to be found in, or doth make a part of the Mosaic dispensation. If the knowledge of philosophy or nature be attainable by human reason and application, there was no need of a revelation ; yet a revelation is given. Why must

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must it be *ad captum vulgi*? A revelation being made, and that from God, implies it to be, in the nature of things, both necessary, full, perfect, and true. Otherwise why was it made? that after ages should find it to be false? This cannot be supposed, without highly derogating from the wisdom and goodness of the Supreme Being; and yet it is supposed by all our learned men. They say, That philosophy not being necessary to salvation, and being what man could by his natural abilities discover, the inspired writers did not meddle with it; and what we meet with in the scriptures, being only incidentally spoken, they conformed to the received opinions of the persons they wrote to; and that as to the Deity, the New Testament has fully opened his nature, essence, and personality, which were either wholly unknown, or but faintly revealed to the Jews.

Whether philosophy is necessary to salvation, I shall not now enquire: but when we know what philosophy is, it may, in its proper place, be shewn to be more necessary to theology than is generally thought; and that human reason, with all its boasted discoveries, has not yet been able to find out the true system of the world. Indeed, when matters are fairly stated, and rightly understood, it will appear, that the Jews were not so ignorant either of *God* or *Nature*

as

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as our learned men would persuade us, and have constantly asserted, without any foundation, save their own want of knowing the scriptures and the power of God. *Judaism* and *Christianity* are but different names for one and the same *belief*; and it was not to the Jews, but to the Gentiles, that the gospel brought life and immortality to light.

That philosophy is incidental only, is an assertion false in fact. The books of Moses begin with an account of the creation, and the steps the Divine Being took in establishing this mundane system. There is a particular mention made of the Spirit, the light, and the firmament, with a physical description of their formation; how the Spirit began to move; how this motion produced light; the light, a firmament or expansion, which by its action divided the waters from the waters, and formed the earth into a stage and storehouse for men; with a distinct relation of the formation of the sun and moon, stars, &c.; the formation of plants, vegetables, animals, and man, until all was completed.

There is also mention of the world being destroyed by a deluge; of the windows of heaven being opened, and the fountains of the great deep being broken up; of the Spirit or wind passing over the earth, and reforming it.

it. These accounts, so circumstantial, seem designed rather to rectify, than to conform to the mistaken notions of mankind. Besides, the miracles in Egypt were all so many controulings of the powers of nature; which powers the Egyptians must have understood, or else they would not, to them, have been miracles. Pharaoh's heart was hardened by his magicians being permitted to do something *like them* in similitude, but not in truth; by which means he was persuaded, that what Aaron did, was no more than what *studiers of nature* could, by their acquaintance with her operation, perform; so nothing but what was natural: but when they could not make dust lice, they were forced to cry out, *This is the finger of God*; to own it was a deed above the power of natural means to perform. *These* objected to the miracles, what our present *wisemen* do to the scripture-account of them, That they only appeared miracles to those ignorant of nature and philosophy; but were phenomena to be accounted for by a knowledge of both.

This may be sufficient to prove, that the mention of philosophy in the scriptures is not barely incidental, nor accommodated *ad captum vulgi*. But we have, besides, an account of the motion of the earth, and of the agents which move it, *Eccl. i. 4.* From whence I think it plainly appears, that
mankind

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mankind must have been acquainted with the powers of nature; otherwise how should they distinguish her ordinary operations from the immediate power or finger of God? And considering the frequent manifestations to the patriarchs, the Israelites must be supposed to have had proper and just notions of the Deity, his nature, and manner of existing: for had God in these intercourses vouchsafed no revelation of himself, but left them to their bare imaginations to frame ideas of his essence and powers; how could they know *the God of Abraham, the God of Isaac, and the God of Jacob, I am that I am*, from the god of the Egyptians, the god of the Canaanites, and the gods of the nations?

Why should it be thought a thing incredible, that the scriptures should give a true description of nature and its great Author? Could not the Creator of all things frame this world so as to give some idea or *simulacrum* of himself? Would he order his servants to use names not significant, or improper, for his being and attributes? Or can we suppose a language formed by his direction, while Adam was perfect, vague and uncertain? and to want words properly expressive of what he thought fit to reveal of himself and his works? Would he give a revelation defective in two such main points, at a time when he was separating the Jews from

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from the rest of the nations, who had apostatised from the true God, *the maker of heaven and earth*, to the worship of his *material agents*? The contest was then the same as in Elijah's time, Whether Jehovah was God, or Baal was God? Whether the sun, moon, stars, and all the host of heaven, were uncreated, eternal, so God; or, whether the Lord Jehovah, the God of the Jews, created and made the heavens, the earth, and all the host of heaven? Was a short dark account, in words inexpressive of God's essence or powers, and a false unintelligible one of nature, a likely method to determine this contest? Why should God give any account of nature, if not a true one? why direct his servants to write *ad captum vulgi*? And if men were then so ignorant as to swallow a false account, could not infinite wisdom foresee, that the present learned race would arise, and be framing schemes to detect the falsity of it? Was not the knowledge of God and nature as necessary to men then, as to men now? And if God was pleased to record his revelation of these things, was he not bound by his veracity to do it truly and intelligibly? When our translation was made, the learned and unlearned both agreed in their notion of philosophy; so the translation was agreeable to the received opinion. Modern discoveries have since set them at variance; and may we not be allowed to query,

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query, whether our translators had a thorough knowledge of the Hebrew, and of nature? or, whether they might not bend their translation to the prevailing notions of the times? and whether we, since the reformation, have been careful in searching the Hebrew scriptures? or whether we have not blindly and implicitly followed the first translators, and traditions of men?

These, and many such reflections, which naturally arise in the mind employed on this subject, lead me to conclude, from the necessity of the thing, and the wisdom and goodness of the Deity, that a full and perfect revelation was at first made, and afterwards renewed, as occasion served, when the wantonness of imagination had corrupted and defaced it, and at last committed to writing by Moses, for the use of the then present and all succeeding generations, to be the rule and standard whereby they should measure and regulate their opinions and belief of things natural and divine.

As foreign as philosophy may seem to theology, we find, in fact, that such as our philosophy is, such is our God; and that our belief in divine, is generally of a piece with our notions in natural things. The Heathens thought the sun, moon, and host of heaven, gods; so worshipped them; and,
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no doubt, mocked the prophets who preached to them, That the Lord made the heavens and the earth. Pharaoh knew not the Lord, neither would obey his voice: why? because the fellows of his royal society deluded him by experiments, into a belief that the powers which Moses attributed to the *Lord*, were lodged in the *material agents*. So now our naturalists pretend, from nature, to find out God; and upon their system of philosophy have built a theology diametrically opposite, in the fundamental point, to what is taught in scripture. “And these things being rightly dispatched,” says Sir Isaac Newton*, “does it not appear, from phenomena, that there is a being incorporeal, living, intelligent, omnipresent, who in infinite space, as it were in his sensory, sees the things themselves intimately, and thoroughly perceives them, and comprehends them wholly by their immediate presence to himself?—— And though every true step made in this philosophy brings us not immediately to the knowledge of the first cause, yet it brings us nearer to it; and on that account is to be highly valued.’——So his definition of his *Deus* makes him to exist in one person; directly opposite, as I said above, to the Christian faith; which teaches, that

* Optics, p. 345. English edit. 1721.

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he exists in three persons. *Omnis homo, quatenus res sentiens, est unus et idem homo, durante vita sua, in omnibus et singulis sensuum organis. Deus est unus et idem Deus semper et ubique, viz.* “ Every man, so far as he is a
 “ thing that has perception, is one and the
 “ same man during his whole life, in all
 “ and each of the organs of sense. God is
 “ one and the same God always and every
 “ where.” This definition of God, and the whole general scholium of which it is a part, was added when it was discovered how subservient his philosophical tenets might be made to the support of those theological ones, which were at that time trying their way in the world, by force of the uncommon abilities and indefatigable zeal of the great Dr. Clarke; and which are now making another attempt upon the public, in proposals for reforming the liturgy.

Thus we see that philosophy has a closer connection with theology, than it is generally supposed to have; and while we are prejudiced with false notions of the one, we cannot be brought to entertain true and proper ones of the other.

For the two grand natural agents, the light and spirit, are not visible to us, and act in the macrocosm and microcosm in so gentle a manner, as not to be perceptible
 but

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but by their effects, (as the antitypes act upon our souls.) But the orbs and things upon which these invisible agents act, are the objects of our senses, stand out to view; while the others are hid from our eyes in a tempest, which no man can see, as the son of Sirach expresses it. If therefore we begin to imagine that there are properties in matter, such as gravity and attraction, and the *vis inertiae*, whereby bodies can act at a distance without contact, (which, if we judge by appearances, we may easily do, as we see not the fluid which moves the orbs); or if, to account for gravity and attraction by a medium, we suppose the particles of that medium *elastic, repulsive*, or what else we please; this draws us in to attribute the essential incommunicable powers of Jehovah to his creature matter; such as, acting where it is not present, giving without receiving, and such like blasphemous absurdities, whereby we may fatally err in our notions of divinity. Besides, if we imagine that philosophy is discoverable by our natural abilities without revelation, or if any one fancies that he has discovered the true system of nature; this introduces another subsequent imagination, That by reason we can search out God, and find out the Almighty to perfection; and the consequence of this, again, is a conceit, that we have no need of revelation; and this begets a neglect of the scriptures, which contain a revelation

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of these points ; and this neglect by degrees hardens into a disbelief, and so contempt, of the sacred oracles of God ; while at the same time it produces a most ridiculous veneration for the reveries and imaginations of men ; makes us idolize human reason, and set it up as the judge of God, and his methods of proceeding with man.

And hence it has come to pass, that of late the scriptures have met with so general a disregard, while at the same time a kind of veneration has been paid to the gravitarian scheme ; and though we have ridiculed implicit faith so much in religion, a more than implicit one has been shewn in our philosophy. We have not dared so much as to examine or question its tenets ; we have been stunned with its praises from the coffee-house up to the pulpit ; and indeed we have made so much of his discoveries, and so little of the Bible ; have ascribed almost divine or supernatural faculties to Sir Isaac Newton, hardly allowed common ones to Moses ; supposed the accounts given by the former to be infallible truth, those of the latter to be downright mistakes and blunders ; and youth are, now-a-days, educated with those notions in their heads ; that, as a late ingenious author has observed, however our Freethinkers may make an outcry against the prejudice of education, education, as it is managed,

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managed, is apparently on their side. To remove this, is the aim and design of this enquiry. I shall therefore, in the course of these sheets, endeavour to shew,

1st, That the Newtonian philosophy has not fixed and determined, to the certainty they pretend, the laws and causes of the several operations and phenomena of nature; that the *cause of motion*, the grand agent of nature, is, by its own concession, yet unknown; and that it has only taken away the real agents, and ascribed their work to properties and virtues without substance: so left us still in quest of the real agent or agents, which perform the effects; and which agents, at different times, have had different nicknames, as *sympathy* and *antipathy*, *gravity*, *attraction*, and *repulsion*.

That this grand secret, which each age has been prying into, I mean the cause of motion, is plainly revealed in the Hebrew scriptures. And this I shall prove by giving a short view of the Mosaic or scripture philosophy.

And, 2^{dly}, Upon the principles of the scripture-philosophy, shall attempt to give an account of the motion of the earth round the sun, and of the agents which perform it; of the courses of the moon, and her

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true path in the heavens ; as also of the nature of the miracle of the sun standing still at the prayer of Joshua ; together with some remarks upon Sir Isaac Newton's doctrine of *light* and colours, designed to shew, that the experiments of that great man, upon that *subtile fluid*, manifestly tend to illustrate and confirm the *principia* of Moses.

And, 3^{dly}, I shall shew, that this material world is an emblem or type of the immaterial ; that it was framed so as to give us ideas, as far as we are capable of taking them, of the essence, existence, and personality of God ; which will prove, to demonstration, the *fundamental point of Christianity*, of which philosophers have so often called upon us for ideas ; and of which they have, by their schemes and calculations, so industriously laboured to destroy the evidence.

CHAP.

A N

ENQUIRY, &c.

C H A P. I.

IN examining the principles of the Newtonian philosophy, I consider gravity in the lights the espousers of the gravitarian scheme have viewed it: *First*, As a *property of matter as such*; or, as some chuse to call it, *a primary affection of matter*; or as it is, by the most sagacious and universally learned Dr. Halley, (an intimate friend and assistant of the author in the publication of the first edition of the *Principia*, and who may well be supposed to know his then thoughts of the matter), resolved into the immediate “will of the Creator, who has
“ appointed it as a law, throughout all the
“ material world, to keep all bodies in their
“ proper places and stations:” And, *2dly*, As it seems now to be looked upon as caused by the impulses of an ethereal medium, flying *here* and *there* throughout the universe. I say *here* and *there*, because a plenitude of

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matter of any sort is positively denied, even by those who talk of the impulses of an ethereal medium being the cause of gravity. And I shall endeavour to shew the inconsistencies of each of these notions: 1st, That matter can have no such property or affection as gravity or attraction, nor act upon other matter at a distance without means, or the intervention of some medium; and, 2^{dly}, That if gravity be caused by the impulse of any medium, all the parts of this medium must be continuous and contiguous, and so a *plenum*.

It may not be improper, before we proceed, to enquire into the state of philosophy when Sir Isaac Newton first wrote; that we may be the better able to judge what are real discoveries, and what might come handed down by tradition.

The revolution of the orbs in circles, ellipses, or whatsoever you please to call their curvilinear orbits; their periodical times, as the earth in one year, Mars in four, Jupiter twelve, Saturn thirty, Venus in seven months and a half, Mercury three months, *rotunde*; that the moon was an opaque body, and received her light from the sun, round which she moved with the earth in one year, while she made a circuit round the earth in one month: these, I say, have been handed
down

down to us probably from the Chaldeans ; at least they are so old, that this or the other age or country can lay no claim to the discovery of them. England, till the reformation, had very little light or learning in these affairs ; what we know of the matter since, has been owing to late discoveries, or rather recoveries ; which, though they prove us to have been in ignorance before, will not with equal certainty prove us to be at the height of knowledge now.

The motion of the earth was not recovered so soon as the rest, not till Copernicus's time, I think in about the year one thousand five hundred ; though they talk of Pythagoras picking it up among the Egyptian priests ; which, even by their own accounts, prevents it being a modern discovery. However, the good people of Europe were then so bigotted to the translations of scripture, that all Copernicus's mathematics could not bring them over to his philosophy.

Several schemes were invented to reconcile matters, and make his philosophy less contradictory to scripture ; but the earth still kept its place, and remained immovable in the centre. Many indeed of the *fort esprits* of the age, out of mere love to novelty, and opposition to scripture, gave
their

their assent immediately, without knowing much of either side of the question, as is usual with them in such cases; but still the majority stuck by the scriptures, and the thing lay dormant, till Descartes, a volatile Frenchman, formed it into a philosophical romance; which, from the nature of his countrymen, and the taste of the times in which he lived, he had hopes would take. He did not positively assert the sun to be fixed in the centre, and the earth to move round it, but took the philosophic licence to suppose it, for the more simple explication of the phenomena of nature.

As a plenum and the air had been generally allowed to be the cause of motion, though they had been very deficient in their account of it; he thought he had hit upon something to supply former defects; so retained a plentitude of matter, and framed his vortices for movers. He made use of the terms *gravity* and *attraction*, but not in the sense the Newtonians use them, but for the effects produced by the *agency* of his *subtile matter*.

The fixed stars he banished out of his system for the same reasons Sir Isaac did, because he knew not of what use they were, and they might do mischief; and so he made them suns to other worlds.

It

It is here to be observed, that the only thing Descartes had to set up for a philosopher upon, was his vortices. *Sympathy* and *antipathy*, *materia subtilis*, *fuga vacui*, &c. had each had its turn, and was each rejected as insufficient.

We could calculate eclipses; knew, as before observed, that the moon was a dark body, and received her light from the sun; and placed the planets and stars at such and such distances, as we judged most agreeable to our schemes. The cause of motion was the grand secret each age had been prying into, and which, every now and then, some or other boasted he had found out.

This then is the only thing can be properly called a discovery, if the present philosophy has happily found out and ascertained it. Newton, however, had nothing to do but to knock down the vortices, and rise up a philosopher. His genius, we are told, led him to mathematics; and he lanced at once into Kepler and Descartes. By a book of the latter, which he made use of when at college, we find him chiefly taken up with the geometrical part; for in several places of the margin is written, *Error, not geometrical*.

But

But what did he give us for *movers* in the room of the *vortices*? Why, gravitation and attraction. What Descartes had made only as effects, he more happily adopted for a cause. One would have thought, when he rejected this *feigned and imaginary matter* of Descartes, he should have given us something real in its place, and not put us off with empty sounds. Instead of this, he retains the same laws of motion, projection, and centripetal and centrifugal forces, and makes the attraction of gravity the grand catholicon of his philosophy. Thales first found out attraction, as we are told, from seeing amber draw bits of straw; Kepler talks of the *virtus attractiva solis*; and Bishop Wilkins, his contemporary and acquaintance, is full of notions of attraction: so the thing is no discovery; only he was the first who (to use a certain author's words) formed it into a *cobweb of circles and lines to catch flies in*. As he found Descartes had laid his scheme too open by writing in a popular way, he took a method more politic, as well as more suitable to the bent of his genius. He drew a magic circle round him, in which he intrenched himself and his philosophy, which secured him from any profane foot breaking in. Οὐδὲς ἀγεωμετρικὸς εἰσιτω, (*Let no one ignorant of geometry enter here*), was the in-

inscription. This is pretty plain from the title of his book, and more plainly told us by himself in the preface to the third book. However, as his panegyrist informs us, "This new system of physics, (though) built upon the *most sublime geometry*, did not, at first, meet with all the applause it deserved, and was one day to receive. It required *some time* before *the world* could *understand it*. The ablest mathematicians were obliged to study it with care, before they could be masters of it; and those of a lower rank durst not venture upon it, till encouraged by the testimonies of the *most learned*." The truth is, men had then some regard for their Bible; so did not readily come into a scheme which had a direct tendency to destroy its authority. Besides, they could easily see, that the proportions of lines and circles to one another, though ever so nicely and justly calculated, had no relation to the *cause of motion*.

"But at last," (adds Mr. F.), "when *its worth* came to be sufficiently known, the approbations which had been so slowly gained, became so universal, that nothing was to be heard from all quarters, but one general shout of admiration." That is, his philosophic system was found to be
a fit

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a fit house for such a god as they then
wanted *.

Far be it from me to detract from any man's real merit and worth, or to endeavour to lessen the esteem he may have got in the world by his writings. It is a laudable undertaking to search into the workings of nature, and thence to display the goodness, the wisdom, and omnipotence of the Creator; and to lay the foundation in well-tried, undeniable experiments, is the surest method to make a lasting superstructure. Had he given a just and faithful detail of experiments; shewed how one thing acted, and was acted upon by another; beginning from the lowest and most conversant among us, of which our senses were the most likely to be proper judges, and in which they were least liable to be deceived; or, to use Dr. Pemberton's words, in his introduction to his *View*, "had
" he secured to himself the knowledge of
" the most immediate cause of each ap-
" pearance, before he extended his views
" farther to causes more remote;" attribu-

* See definition of his *Deus* at the end of the *Principia*. In 1689, there was an attempt to set aside the *Athanasian creed*, but it did not succeed. The first edition of the *Principia* was in 1687; the second in 1713, when the definition of *Deus* was inserted in the *scholium generale*, which the first edition had not. It is worth observation, that between 1687 and 1713 sprung up our Antitrinitarians.

ting no properties to matter, but those of possessing its own space or dimension, and of impelling and being impelled by contact; and, by these rules, judged how things must act which are out of our reach: he had acted the part of a philosopher, and his philosophy might have been of real service. But when a person, from some actions of nature, visible to all, of which he owns he knows not the agent or cause, (as of the descent of a falling body, for instance, which he says may be performed by impulse of the air, for ought he knows), which at first setting out he pretends only to call the attraction of *gravity*, as a term of distinction, without assigning it as the cause of the action; when he thinks he has drawn his readers into a good opinion of himself, his knowledge, and love of truth, craftily takes the advantage to impose upon them the actions for the agents, the effects for the cause: if, at the same time, he thereby knowingly contradicts the accounts given by men acknowledged to be inspired by God, the author of nature, of the creation, formation, and actions of matter, without ever pretending to have examined or understood these accounts; and this in a country where the writings which contain these accounts are received as holy, and a religion founded upon them; he acts neither the man, the philosopher, nor the christian.

I can-

I cannot help thinking, that our philosopher has fallen into one of the errors to which, as Lord Bacon observes, particular persons are more especially obnoxious, namely, that as we are exposed to be captivated by any opinions which have once taken possession of our minds; so, in particular, *natural knowledge* has been much *corrupted*, by a strong attachment of men to some one part of science, of which they reputed themselves the inventors, or about which they have spent much of their time; and hence have been apt to conceive it to be of greater use in the study of *natural philosophy* than it was. Thus the doctrine of *prime and ultimate ratios*, which Sir Isaac Newton introduced into geometry, and of which he makes great use in calculating the centripetal force, prevents his followers from enquiring after, or listening to any enquiries after the real agents that carry on the oeconomical operations of nature; and they seem so captivated therewith, that they think all nature must be obedient to their numbers.

It must needs be surprising, nay, shocking, to find so many opinions, diametrically opposite to each other, stalking daily about, passing themselves upon the world for demonstration and truth, and at different times, by different persons, embraced as such. But
we

we must consider there are many ways to error, and but one to truth ; and we see there are always some, who, to enrich themselves, endeavour to pass counterfeit coin for Sterling. Besides, our greatest mistakes in judgment proceed from a cause of which we are not sufficiently aware ; which is this : We attend so closely to the consequences, that we overlook the premisses ; and while we are so very careful to examine those, take these for granted. Hence we take propositions to be really demonstrated, which have nothing but the *air* of demonstration, and are hereby led sometimes to give our assent to the greatest absurdities. By these means, cunning and designing men, by falsely stating a case, or laying down false premisses, and reasoning from them, draw true conclusions, which deceive unwary readers into a belief of the truth of the premisses, when they are utterly false. And though these artifices have been often detected, the state of the case, and the premisses proved to be false, and thence all the conclusions good for nothing ; yet the notion of I know not what demonstration, once received, so runs in, and fills the heads of the readers, that it is a difficult matter to beat it out, or persuade them to re-examine the subject. We ought therefore to take great heed, and be very careful what we admit for *principles* and *data* ; especially in an affair of that consequence

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sequence as philosophy; because on our sentiments of *nature* will be formed our notions of *its author*. To demonstrate, is to bring things under the cognisance of our senses, which supposes the things to be objects of sense. Mathematics are most capable of demonstration, because the things they are conversant about, are really the objects of sense: the mind has immediate perception of the things themselves; so the ideas taken from them are real and adequate, and its knowledge is in many cases intuitive. “But
 “ the proofs in natural philosophy cannot
 “ be so absolutely conclusive as in the ma-
 “ thematics, the subject of our contempla-
 “ tion being without us, and not so com-
 “ pletely to be known.” This *the author* of the *view of Sir Isaac Newton’s philosophy*, in the passage above, confesses; and at the conclusion says, “To acquiesce in the ex-
 “ planation of any appearance, by asserting
 “ it to be a general power of attraction, is
 “ not to improve our knowledge in philo-
 “ sophy, but rather to put a stop to our far-
 “ ther search.” So we have this gentleman’s leave to make a further enquiry; and, in doing it, we must not only examine thoroughly the principles we go upon, but the means we have of coming at the knowledge of them; because, if it should happen that the mind of man has no natural powers of acquiring (without revelation) the know-
 ledge

ledge of the cause of motion, for instance, while they think they are reasoning, they will prove only to be imagining.

Men may aim at forming ideas of such things, but this is only imagination. It is natural from supposed or real premisses, to reason falsely or truly; suppose this or that, and the consequences will be so and so: the reasonings in both cases are just, but the evidence in one case is not true. He who supposes an imaginary agent performs an action, if he understand the action, may reason as justly upon that action, as if he knew the real agent. A man who gives the name of *gravity*, *attraction*, &c. to the cause of the operations of nature; as far as by observations he has discovered, or imagines he has discovered these operations, so far he reasons as justly as if he knew the real cause. But still this will not prove his imaginary powers to be the real ones. This being unknown, all he has found out, only amounts to this, that something does, or is the cause of something. Such a poor business is all our boasted knowledge and philosophy. By this it seems they have mistaken the actions for the agents, and have only discovered the effects, while they imagined they knew the causes. Calculating the velocity, &c. of a falling body, and supposing that it descends to the earth by gravitation, is not finding

where it is, and what it is that gives it motion. Much less will it prove, that matter has any attractive virtue to draw other matter to it; which is giving it a power of acting where it is not present; a power they deny their *Deus*. To persuade me there is a power in the earth to draw a stone to it, and in the stone to obey and come to it, because I see it fall to the ground, is the same as to tell me a pendulum has motion in itself, because, what? I see it move. This I presume would not be a satisfactory answer to one who enquired after the mechanism of a clock. These gentlemen can swallow transubstantiation from a Newton, though they strain at it from the Pope. They can believe that gross bodies are convertible into light, and light into gross bodies; earth into fire, *et è contra*; water into a stone*; and that salts, sulphurs, tinctures, sludge, loam, clay, sand, stones, corals, and other earthly substances, are formed from the vapours which arise from the sun, fixed stars, and the tails of comets, (See *Newton's Principia*, p. 526.). I say, the man who, under the character of a philosopher, imposes such idle figments upon his readers, puts a greater violence upon, and offers a greater affront to their senses and reason,

* Optics, Lat. edit. 1719, p. 378. English edit. 1721, p. 349.

than

than he who preaches *transubstantiation*; since these transmutations are not greater contradictions to sense, than to believe a wafer, by consecration, to be convertible into flesh and blood. And, indeed, in what are the above metamorphoses less absurd, save that they have the sanction of Sir Isaac Newton, than the Rosicrucian doctrine of transmuting base metals into gold? For if these changes are very conformable to the course of nature, which seems *delighted* with transmutations, why should she be so averse to this? why should the alchymist despair of finding the philosopher's stone? or where is the absurdity in attempting it? And, notwithstanding the great name which authorises and makes them current, such propositions as these, though proposed but by way of queries, considering they were the author's last guesses, when near eighty years old, betray an uncertainty, an unacquaintedness with nature and her operations, ill becoming a naturalist.

Indeed our philosophers, while they profess physics, fly to metaphysical causes: for this surely must be the distinction between them. To shew how one sort of matter is moved or acted upon by another here, and so backward or upward, till it be out of reach; attributing no other properties to any atom of inanimate matter, other than

solidity and extension, bounded by surface, which describes its dimension and figure; and no other powers than to act or move passively; that is, in short, to explain things mechanically, is the business of physics, or natural philosophy. To suppose properties inherent in matter, such as gravity, attraction, and by them to solve the appearances of nature, without shewing, or pretending to shew how matter came endued with such powers, or how such powers act, is to talk metaphysically, to attribute actions, &c. to supernatural agents: for since these powers are occult, and the cause of them confessedly unknown, they cannot prove whether they are natural or supernatural; so can never be the subject of natural philosophy. Mr. Cotes, in his preface to the second edition of the *Principia*, seems to be in great pain for gravity being reckoned an occult cause, and labours to prejudice his readers in its favour. He reasons thus: “Those
 “ only are occult causes whose existence
 “ is occult, fictitious, and unproved; not
 “ those which by observations are clearly demonstrated to exist. Gravity therefore will not be an occult cause of the
 “ celestial motions, since it is shewn from
 “ phenomena, that this virtue really exists.”
 What is shewn to exist? the phenomena shew gravity to be the effect of some cause. First prove the cause, and then draw your conclusions. “ At this rate (cries out the
 above

above Gentleman) “ you will sap the very
 “ foundation of all philosophy;” (their phi-
 “ losophy will indeed be in danger). “ Cau-
 “ ses are wont to go on in a continued se-
 “ ries from compounded ones to those more
 “ simple. When you arrive at the most
 “ simple cause, you can go no further : of
 “ this therefore no mechanical solution can
 “ be given ; if there could, this would not
 “ be the most simple or uncompounded
 “ cause.” This is begging the question.
 Gravity is not yet proved to be a cause,
 much less the most simple cause ; it appears
 only to be an effect of some other cause ;
 which, if known, would not prove that no
 mechanical solution could be given of it.
 “ Gravity and attraction suppose one body
 “ to act upon another at a distance, or
 “ where it is not ; but nothing can be an
 “ agent where it is not at all. Matter can
 “ act only by contact, impelling contiguous
 “ bodies when it is put into motion by
 “ something else, (*viz.* other matter), or
 “ resisting those which strike against it when
 “ it is at rest.” So gravity, in their sense,
 must either be God, or the immediate and
 continued act of God upon matter. Besides,
 if the sun gravitate upon the earth, and the
 earth upon the sun, the sun must lose as
 much of the gravitating power as it imparts
 to the earth, and the earth as much as it
 imparts to the sun ; unless some acting or

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vivifying principle reside in the sun and earth to renew the attractive or gravitating power continually: And this power must be either material or immaterial: if material, then gravity is the effect of matter acting upon matter; if immaterial, it must, at last, be resolved into the immediate operation of God; so no principles of natural philosophy. An occult quality is defined by the ancients to be “such of which no rational solution in their way, or according to their principles, could be given.” Now, as neither Sir Isaac Newton, or his followers, pretend to give any rational solution of gravity in their way, or according to their principles, gravity comes directly within the definition of an occult cause.

What have all our boasted discoveries amounted to? Things go on as they have done ever since the formation. One says, God, by his immediate power, does all this: another, that active principles in matter perform the business; owns he knows not the cause, but says the actions are done. What greater knowledge of natural philosophy have our modern reasoners shewn than the Heathens? The latest of them had several cant words, without any meaning, which, as it was to be supposed, contained their extent of knowledge.—*Nature* was the word with them for the ruling powers in this system;

system ;—*gravity* is the word with us.—
 They pretended to give no evidence for this
 assertion, but the disciples of each party had
 recourse to the *Ipsè dixit* of their master ;—
 our philosophers produce no agents sufficient
 to perform the actions they say are done,
 but expect we should take their words, and
 ask no questions.—We have got no
 farther, by the help of gravity, than the
 poor Indian philosopher did, by means of
 his elephant, which he found out to support
 the earth. — But what supports this
 Elephant ? — Oh ! — a tortoise ! Sir Isaac
 Newton too, not to be behind hand in dis-
 coveries, has provided a tortoise to support his
 elephant ; though it is generally thought the
 building is weakened by this underprop, and
 that the first is a question not to be an-
 swered.

But I shall be told, that the existence of
 these powers, attraction and gravity, is con-
 firmed by repeated experiments, and the
 deductions from them mathematically pro-
 ved.

But what is confirmed by repeated experi-
 ments ? Only an effect of some unknown
 cause.—A stone descends to the earth ; the
 earth is carried round the sun ; the moon
 round the earth ; and so of the planets, which
 are carried in their orbits round the sun, and
 their satellites round each of them. This
 effect

effect we call *gravity*, and *attraction*, or the *attraction of gravity*: but *sympathy*, or any other term, will serve as well; and the phenomena will as much prove that sympathy is the power which acts, and that all things sympathize to each other, as that they gravitate to each other. One thing tending to another, does not prove that the tendency is in the body tending or tended to; because it may be pushed or impelled by a force *ab extra*. And this, in reality, is the point in debate between the Newtonian and Mosaic philosophy, *viz.* Whether the power which makes things gravitate is inherent in matter itself? or, Whether the air, in its different conditions of light and spirit, does not act upon every the least particle of matter, and press and impel each to each other?

Indeed the espousers of Sir Isaac's philosophy seem now sensible of the absurdity of the doctrine of attraction. And the ingenious Mr. Maclaurin, who is the last person that has undertaken to clear him of that absurdity, acquaints us, " That Sir Isaac never
 " imagined that bodies could attract each
 " other, without being impelled or acted
 " upon by other bodies;—that he never
 " affirms or insinuates, that a body can act
 " upon another at a distance, but by the in-
 " tervention of other bodies; and that he
 " has plainly signified, that he thought those
 " powers

“ powers arose from the impulses of a subtile
 “ ethereal medium that is diffused over the
 “ universe, and penetrates the pores of grosser
 “ bodies: that it appears from his letters to
 “ Mr. Boyle, that this was his opinion early;
 “ and if he did not publish it sooner, it pro-
 “ ceeded from hence, that he found he was
 “ not able from experiments and observation
 “ to give a satisfactory account of this me-
 “ dium, and the manner of its operation,
 “ in producing the chief phenomena of na-
 “ ture.”——But where has he published
 this his opinion, except only by way of que-
 ry? and this in direct contradiction to his
Principia. And even this is done, after the
 manner of his famous Greek and Phœnician
 philosophers, tacitly. For in the first edition
 of his *Principia*, 1687, there is no mention
 of his subtile spirit: and in his other editions,
 although he sometimes says, that, for ought
 he knows, gravity may be caused by impulse;
 and, at the end of his book, talks about a
 most subtile spirit penetrating, and lying hid
 in bodies; yet in his calculations and demon-
 strations throughout the *Principia*, he ne-
 glects the consideration of this medium, and
 supposes the planets to move by gravity, in
 places void of all sensible resistance, and
 consequently void of all sensible matter.

From whence it is evident, he could not
there nor *then* consider gravity as the impulse
 of

of any medium; because a medium which cannot resist, cannot impel; and a medium that can impel, must likewise resist. And though, in his *Optics*, he introduces an ethereal medium, yet he rejects a dense one; although he could not be ignorant, that it is the dense or grosser part of the aerial medium which is the cause of motion to such bodies as are confessedly moved by the fluid of the air.——It is the dense or grosser parts of the aerial fluid that impel the bullet from the wind-gun.——It is the dense or grosser parts that impel, and continue a ship under sail in motion.——It is the dense or grosser parts of the air which rush into those which are thinned by the firing of gun-powder, and pursue and carry the ball.

And, from Mr. Cotes's preface to the second edition of the *Principia*, it is very easy to gather, that it was not *then* designed that gravity should be looked upon as caused by the impulses of any medium: for the points he labours to establish, are the impossibility of motion in a plenum by impulse of a fluid medium, and consequently the necessity of a vacuum; and to divest people of the notion they had then got into their heads, that gravity was no better than one of the occult qualities of the schoolmen. "There can
" be no room for the motion of the comets,
" unless

“ unless the celestial spaces be entirely cleared
 “ of that fictitious matter ; or if they will
 “ have the heavens filled with a fluid matter,
 “ they must suppose it void of any *vis iner-*
 “ *tia* ; if it has no *vis inertiae*, it can have
 “ no force to communicate motion ; if it
 “ has no force wherewith to communicate
 “ motion, it can have no force to produce
 “ any change in one or more bodies ; and
 “ if it has no faculty wherewith to produce
 “ any change of any kind, it has no manner
 “ of efficacy : therefore certainly this *hypo-*
 “ *thesis* may be justly called *ridiculous*, and
 “ unworthy a philosopher ; since it is alto-
 “ gether without foundation, and does not
 “ in the least serve to explain the nature of
 “ things.” Thus says the ingenious Mr.
 Cotes in his preface. What would he have
 said, had he lived to see an hypothesis pro-
 nounced by him to be ridiculous, and un-
 worthy a philosopher, adopted by a cele-
 brated Newtonian and mathematician, to free
 Sir Isaac Newton from the imputation of
 making gravity a property of matter ? And
 in the edition of his *Optics* 1706, Sir Isaac
 says, “ *That feigned and imaginary matter*
 “ with which the heavens are filled, is by
 “ no ways useful for explaining the phe-
 “ nomena of nature ; since the motions of
 “ the planets and comets, by the means of
 “ *gravity*, are better explained without it ;
 “ and gravity has not, as yet, been explained
 “ by

“ by it.” In the edition of 1719 by Clarke, and his own of 1721, this same query is differently worded ; and he talks of filling the heavens with an exceedingly rare ethereal medium. So then, in 1706, this rare ethereal medium was of “ no use towards the “ explanation of the phenomena of nature, “ and served only to disturb and retard the “ motion of the heavenly bodies, and make “ the frame of nature languish :” but, in 1719 and 1721, this rejected medium is again taken into service, to explain gravity, and the phenomena of nature, which before were better explained without it ; and now *a dense medium* is only excepted against ; but, at the same time, he makes this medium so exceedingly rare, as not to answer his purpose. Now, in what light can we view these self-contradictions, but as studied evasions to the objections made by Mr. Leibnitz and others, and to what he saw his *Principia* so justly liable ? For in the dispute between Mr. Leibnitz and Dr. Clarke, this medium is denied to be sufficient for the explanation of the phenomena of nature ; and Mr. Leibnitz, by way of triumph, is called upon to shew how it acts.

Indeed, in the last edition of his *Optics*, he talks much, by way of query, of an ethereal medium ; and one is sometimes tempted to think him inclined to make it
the

the cause of gravity. But then, as he was conscious of the necessity of two mediums, the one denser, the other rarer ; or rather of a plenitude of matter, alternately put into different conditions, to perform what he saw was performed in the universe ; he absolutely denies the existence of such a medium. In short, he would fill the celestial spaces with a rare, unresisting, *inactive* medium ; and yet suppose that this medium may suffice to impel the planets with all that power which he calls *gravity*. So that gravity *thus* explained, amounts to no more than gravity unexplained, or considered as a property of matter ; and this ethereal medium is no better than the *materia subtilis* of Duns Scotus. For if neither Sir Isaac Newton, nor any of his followers, have demonstrated the laws of this ethereal medium, and proved to satisfaction how it acts upon matter so as to be the cause of gravity, it is a mere *gratis dictum* to talk of its being the cause of gravity ; since if this medium have no resistance, no *vis inertiae*, it is neither fit for motion, or to be the cause of motion ; since bodies, according to their laws, continue in motion by the *vis inertiae* alone, after the *vis impressa* has left them ; and if it have *vis inertiae*, then it remains for them to shew how that power is overcome. Now, if this medium, assigned for the cause of gravity, be insufficient for that purpose ; or, to use Sir
Isaac

Isaac Newton's own words, gravity has not as yet been explained by it; gravity can be accounted only a virtue, disposition, affection, or property of matter; or the farthest they can go, is to call it an effect of some unknown or unexplained cause. For to say that gravity is caused by the impulses of an ethereal medium, and yet neither to be able to tell us what this medium really is, or how it acts, is to tell us nothing; and is a disingenuity not becoming a philosopher. But how are we to distinguish *this* medium from that which he rejects? for one egg is not more like another, than his subtile ethereal medium which is now introduced to explain gravity, and that *feigned* and *imaginary* matter which he has expelled out of the celestial spaces, to make way for the regular and lasting motions of the planets and comets. Besides, when this his opinion of the agency of an ethereal medium, as delivered in his *Optics*, was urged by Mr. H. and his friends, as a concession of motion by impulse of the fluid of the air in its different conditions of light and spirit; then the Newtonians made light of his queries, as what we might not rely upon, and from which we could not argue, or draw any conclusions with certainty; and chose to stick by gravity unexplained, as a quality or property belonging to every particle of matter; or as, what Mr. Cotes calls it in his
preface

preface to the *Principia*, “a primary affection of matter; which, as it is *primary*, cannot depend upon any thing else:” so no mechanical solution of gravity by the impulses of an ethereal medium; which, as taken notice of above, Mr. Coates rejects as ridiculous, and unworthy a philosopher. So that the cry is greatly changed. And although these gentlemen publicly affect to treat our author and his writings with much contempt, yet it looks but like a copy of their countenance; since they are now obliged to take refuge in the very medium they before rejected, and which our author from the scriptures proposed to them as the medium and cause of projection and attraction, and even to fill the voids they with so much labour and pains have been making for the regular and lasting motions of the planets and comets, with an impelling, and consequently a resisting medium.

But, whilst the doctrine of a vacuum is maintained, the absurdity of this subterfuge will still remain. And I am surprized so penetrating a genius as Mr. Maclaurin did not perceive, that while he is bringing arguments against a plenum, or the continuity and contiguity of matter, and establishing a vacuum, he is actually pulling down with one hand what he is building up with the other. For if gravity and attraction be

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caused by the impulses of an ethereal medium ; as there is no place in the universe where these effects of gravity and attraction, I presume, may not be produced ; or as, by their own accounts, “ this power of gravity “ is extended from the sun, through the “ whole interval between him and the whole “ planetary system, and acts in every part “ of the intermediate space ;” then there is no place in the universe void of this ethereal medium : and if this ethereal medium be diffused over the universe, then its constituent parts must be in contact ; so continuous and contiguous ; otherwise there would be a place where these effects could not be produced, contrary to the above assertion, and to matter of fact. Nay, indeed, unless the parts of this medium be continuous and contiguous, it cannot impel ; because to suppose that any particle of this medium can move or impel, without itself being moved or impelled, is the very same absurdity which this medium is introduced to remove. For if a single particle or atom can move, or be attracted, without an impellant ; then, by parity of reason, one globe may move or attract another without the intervention of this medium : but if one globe cannot attract another without impulse, which Mr. Maclaurin admits ; then one atom cannot attract or move another without impulse ; and impulse cannot be performed without contact.

And

And if the particles of this ethereal medium be in contact with each other, and diffused throughout the universe, and pervade the pores of bodies, then there can be no vacuum, no vacancy large enough to admit an atom or particle; because the intervals or interstices formed by the atoms or particles, must be smaller than the atoms or particles which form them. Again, as bodies descend in the exhausted receiver, and gravity is caused by the impulses of a subtile ethereal medium, this their descent is caused by the impulses of an ethereal medium; and then the exhausted receiver, by their own confession, must be full of this ethereal medium: so no proof of a vacuum, which it is usually brought to prove, but an unexpected proof of a plenum, and of motion in a plenitude of matter, which it is brought to disprove: for this medium, by this account, must be in the receiver after it is exhausted of the air, and must be the cause of the descent of bodies in it; therefore its parts must be in contact, and so a plenum.

Besides, this account of motion by impulse of an ethereal medium, is diametrically opposite to the account of bodies continuing in motion by the *vis inertiae* of matter; which *vis inertiae* is, by Mr. Maclaurin, and the Newtonians in general, as far as appears

by their writings, still looked upon, and acknowledged as the nature, or an essential property of matter, as matter. For if a body, after being put into motion, is able, by the *vis inertiae* alone, to continue itself in motion until something stop it; and, to make way for the regular and lasting motion of the planets, they must be supposed to move in spaces void of *all matter*; what becomes of this ethereal medium diffused throughout the universe? And as they now seem to see the absurdity of gravity taken as a property of matter, I wonder they do not see the same of the *vis inertiae*, which is still considered as a property of matter. For surely it is every whit as absurd to say, that bodies continue themselves in motion, without being impelled or acted upon by other bodies, by the charm or unknown virtue of the *vis inertiae*, as to say, that bodies gravitate to each other without the means of any impelling medium, by the charm of attraction. And it is equally the same absurdity, to imagine the continuation of motion to be owing or essential to the *vis inertiae* of matter, as to imagine a natural tendency essential to matter. And yet Mr. Maclaurin, though he rejects the one, adopts the other; and while he makes the *impulses* of a subtile ethereal medium, that is *diffused over the universe*, the cause of gravity and attraction, he at the same time maintains,

maintains, "That the motions of the planets and comets, in the *free* celestial spaces, require no *new impulses* to perpetuate them." To such absurdities and self-contradictions will the defence of a favourite scheme reduce the greatest genius!

Again, an ethereal medium, be it ever so subtle, cannot be divested of the *vis inertiae*, without taking away its activity, or mechanical force to impel bodies; as Mr. Maclaurin justly observes, in arguing against the supposition of a late ingenious gentleman, Dr. George Martin, that space was not empty, but filled with an exceeding subtle ethereal medium*. Now, as this ethereal medium, which is now introduced to explain gravity by the friends of our English philosopher, has an impellent force, it must consequently be endued with the *vis inertiae*. How, I ask, is this *vis inertiae* overcome? and why does it not retard the motion of the planets and comets moving in this circumambient resisting medium, and make the frame of nature languish? Was it not incumbent upon Mr. Maclaurin, when he was objecting to the possibility of motion in such an ethereal medium, as the above-

* A little anonymous pamphlet, published in 1740, intitled, *An examination of the Newtonian argument for the emptiness of space*, &c.

mentioned author supposed to exist, and be diffused over the universe, and this upon account of its *vis inertiae*; was it not incumbent, I say, upon him, to shew, that his own proposed medium was not liable to the same objection, as it had, by his own confession, the same *vis inertiae*? The one, Mr. Maclaurin, supposes a subtile ethereal medium diffused over the universe; the other, Dr. Martin, is against the emptiness of space, and would fill it with a subtile ethereal medium; and contends for the possibility of motion in such a medium. No, cries Mr. Maclaurin, this cannot be; for subtilize your medium as much as you please, the *vis inertiae* will remain, and hinder motion! But where is the difference of these mediums, that motion should be practicable in the one, and not in the other? The reader might have expected that Mr. Maclaurin should have shewn the difference; for if there is none, then the same difficulties with which the one is pressed, equally affect the other; and he is stabbing himself with his own weapon.——“What if the
 “ *ignis* of some folks, the *æther* of others,
 “ the *materia subtilis* of others, be at bot-
 “ tom, when thoroughly explained, one
 “ and the same thing?” says the ingenious author of the above-mentioned pamphlet. And let me add, what if the *vis inertiae* of matter, as well as gravity, is owing to the universe

universe being full and bounded, and to the continuity and contiguity of its constituent parts?

However, while the Newtonians continue to make the *vis inertiae* an essential property of matter, and insist upon the necessity of the emptiness of space for the continuation of motion; and until they shew how gravity arises from the impulses of their ethereal medium; they must excuse me if I treat gravity no better than as a property of matter. For how can the celestial spaces be empty with an ethereal medium diffused over the universe? and how can gravity be caused by the impulses of this medium, unless its constituent particles be in contact?—Perhaps they may find a vacuum a post as untenable as gravity; and then we may expect to hear, that by a vacuum they only mean such a place, or space, as motion can be performed in, without determining whether that place, or space, be empty or full.——To alledge that there can be no motion without a vacuum, and that the planets move in empty space, and yet to say that the powers of gravity and attraction arise from the impulses of an ethereal medium diffused over the universe,—is saying and unsaying; is making a vacuum absolutely necessary for motion, and then filling it with matter to produce that motion.

But I find they are for making this subtile medium less inconsistent with what they call a vacuum, by supposing, that the subtilty or rareness of a medium consists in its particles standing aloof, or at a distance, the one from the other; and the greater the distances of the particles, the more subtile or rare the medium. But this will not do their business; because they must not exclude the continuity and contiguity of the particles: for if they do, then this medium cannot be the cause of gravity. *Pellere enim et peli nisi tactu nulla potest res; i. e.* “No body can impel or be impelled but by touch or contact:” and if they allow the parts to be in contact, then there is a plenum to all intents and purposes. And when the truth comes out, they will find their vacuums as full of matter, though not in the same condition, as what others call a plenum. In their artificial vacuum of the exhausted receiver, the finer particles of air (what Sir Isaac Newton calls *æther*, and Mr. H. *light*) are pressed through the pores of the glass into the receiver, as fast as the grosser parts of the air are drawn out; until the receiver is as full of light as it was before of the air, in its common mixture of finer and grosser particles; or, as Mr. H. words it, of light and spirit. And the celestial spaces between the enlightened hemispheres
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of the planets and the sun, are as full as the spaces between their dark hemispheres and the confines of this system. Only the matter is in different conditions. From the enlightened hemispheres of the moving orbs to the sun, it is finer and finer, till you come to that luminary itself, where all is fire and flame. From their dark hemispheres, to the confines of this system, it grows grosser and grosser, until you arrive at the very verge or extremity where it is darkness palpable, or darkness which may be felt, or *outer darkness*, σκοτος εξωτερικη; in which condition I suppose the gross stagnated or congealed air without or beyond the remotest of the fixed stars. And the motions of the planets and comets are regular and lasting, because the impulses which carry them in their courses are regular and lasting; as will be made appear when I come to treat of the motion of the earth, and the agents which move it.

From this account of Mr. Maclaurin's it plainly follows, that the *principles* of the Newtonian philosophy are, properly and strictly speaking, an *ethereal medium diffused over the universe*; which medium is particularly acknowledged to be the cause of the attraction of gravity, a main principle of that philosophy: and to render them *mathematical principles of natural philosophy*, the
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mathematics should be applied to this subtile ethereal medium, which is confessedly the principle and cause of the forces of nature. But is this done! So far from it, that there is not the least consideration of such a fluid in any of the problems and theorems of the *Principia*; and the whole is built upon the planets and comets moving in free spaces, void of all sensible resistance, by the *vis inertiae*, and the attraction of gravity, not there considered as caused by the impulses of any medium.

Now, supposing I allow, that, in treating in a general way of the centripetal forces, Sir Isaac may make tolerable guesSES, without taking this ethereal medium into his calculus; yet will any one say, that these powers may be as nicely investigated, and as accurately demonstrated, without, as with the consideration of this ethereal medium, granting, as it is granted by Mr. Maclaurin, that this medium is the principal and cause from which these powers result? And in particular and complicated cases, it surely becomes more requisite to take into examination the cause, in order truly to account for the effects produced by that cause; yet this medium, which, as it is affirmed, the great author of the *Principia* always looked upon as the cause of gravity, is entirely neglected in his calculations; and yet he is supposed

posed to have given us as perfect a theory of gravity, as if he had been ever so well acquainted with the cause, and had taken this medium into his calculations.

The earth gravitates to the sun; the moon to the earth, and also to the sun. Now, if this gravitation be owing to the impulses of an ethereal medium diffused over the universe, and intermediately placed between these bodies; then it is the fluid medium, and not the solids, which acts: and this medium must be continuous, and its particles must be in contact with each other, and with the bodies upon which it acts. And to find the law of the centripetal force, which continually draws the earth from a rectilinear to a curvilinear course, and retains it in its orbit round the sun; to find the law of the centripetal force, that keeps the moon in her orbit; to find the forces with which the sun disturbs the motions of the moon; to find the force of the sun to move the sea, and the force of the moon to move the sea; his mathematics, I say, to find these, should have been applied to this ethereal medium, whose action and impulses are now confessed to be the cause of all these effects: and he should not have given us, for proof, propositions, designedly laid down in his first book, and demonstrated from the ratio of lines and circles of his

his own drawing, upon such and such suppositions of things being so and so. For admitting that the propositions there laid down are demonstrated; yet, to make them cases in point, it remains to be shewn, that this ethereal medium, which is now allowed to be the cause of gravity, acts in the very same manner, in the same proportions, by the same laws, and with the same forces, &c. upon the earth, moon, and sea, &c. as he supposes gravity to do. And if he did not thoroughly know the nature and quality of this ethereal medium, by whose actions, not only the above, but all the operations of nature are performed; which is also acknowledged by Mr. Maclaurin; with what face could that gentleman, or can any of his admirers, pretend, that he has laid down the principles of the true philosophy; since those principles are now, *ex confesso*, that very ethereal medium, of whose nature and operations they own he was ignorant? And it is an uncommon method of vindicating Sir Isaac Newton from making gravity a property of matter, by supposing, that he tacitly attributed that power to the impulses of an ethereal medium, which he deemed of so little significance, that he did not think it worthy of consideration in any of his calculations †; and

† See definition 1. of his *Principia*.

and which, if he had, he was not able to determine, and demonstrate how it operated : and if he did not know how it acted, he could not be sure that it was the cause of gravity, or that it acted by the same laws by which he makes gravity act. Besides, a chief part of the *Principia* is founded upon the resistance of mediums to bodies moving in them, as laid down in the theory of resistances in his second book. And he there proves, mathematically, that this resistance is principally owing to the *vis inertiae* of matter ; of which if you suppose the medium to be divested, you at the same time divest it of *its activity, or mechanical force to impel bodies*, (to repeat Mr. Maclaurin's words), and thereby render it unable to produce any of the effects which are now attributed to it. " For action and reaction" (says Mr. Maclaurin) " are always equal ; " and we know of no force in bodies but " what arises from their resistance to change " their state, or their *inertia*." So that, if this ethereal medium be the cause of gravity, as they will now have it to be, another theory of resistances will be necessary, to shew, how bodies, moving in this medium, overcome the resistance it must necessarily give them. At present they suppose this medium to *act*, but not *resist*. " But" (to conclude in Mr. Maclaurin's own words) " they have neither made this
" strange

“ strange supposition probable, nor even
 “ credible, nor can they shew that it would
 “ answer their purpose.”

Mr. Cadwallader Colden saw the inconsistency of Sir Isaac Newton's scheme in both these cases; either considering gravity as a property of matter, or of making the impulses of an ethereal medium the cause of it, while the *vis inertiae* of matter, and a vacuum were maintained. The first of these cases he shews to be absurd; and that the second cannot take place unless there be a plenum. The objection to a plenum, and to motion in it, is the *vis inertiae*, or resistance of matter; and he imagined, that he had hit upon an expedient to supply defects, by supposing this system to be filled with three sorts of matter, endued with properties different from each other. The first sort of matter, of which the planets and bodies in general are made, is such as has in itself only a power of resistance. The second, which he calls *light*, is such as has a power of *self-motion*, or of moving itself, but no power of resistance. And the third, which he calls *æther*, is such as has in itself an elastic force, but has neither resistance nor self-motion; and which is by far the greatest part of the universe. But this supposition is liable to the same objections it is brought to remove. For surely it is

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as unphilosophical to make motion essential to any species of matter, as to make gravity essential to matter in general; and it is as difficult to conceive or shew, how any particular species of dead inactive matter comes to be endued with the power of self-motion, as to conceive or shew how matter has in itself a power of gravitation; and if it be deemed necessary to have recourse to the impulses of an ethereal medium for the cause of gravity, which is one species of motion, there seems to be an equal necessity to make the same agent the cause of motion in general.

Now, when I see persons of such sagacity and application, as Sir Isaac Newton really was, and Mr. Colden appears to be, beating about the bush without ever starting the game of which they were in quest, it convinces me, whatever it may others, of the insufficiency of human abilities: since no one, after the knowledge of the mechanism of the heavens or airs was lost, has been able, by searching, to recover it, though they have been continually seeking, if haply they might grope after it and find it; though it is not far from every one of us; for in it we live, and move. If these searchers would turn themselves to revelation, they would soon see how the operations of nature are carried on mechanically, without

out attributing to any one particle of matter, any power of motion, or attraction, or any property, save only solidity, size, and figure.

I proceed, in the next place, to examine his laws of motion; but must beg leave, first, to give the reader a state of the case. The mathematical principles of Sir Isaac are founded on two theories, namely, the theory of the attraction of gravity, and the theory of the resistance of mediums to bodies moving in them. His definitions, laws of motion, and propositions by induction drawn from them, are all calculated to the supposed powers of gravity; not as caused by the impulses of any ethereal medium, but as a primary affection of matter; for he omits the consideration of any such medium, as he himself confesses. And from an experiment which he made, on purpose, to try whether any such medium existed; because, as he tells us, it was the generally received opinion of the philosophers of that age †, that a subtile ethereal medium did actually exist, and freely pervade the pores of
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† In the first edition of the *Principia*, 1687, his words are, *Denique, cum receptissima philosophorum ætatis hujus opinio sit, medium quoddam æthereum et longe subtilissimum extare, quod omnes omnium corporum poros et meatus liberrime permeat.* In 1726 it was only, *nonnullorum opinio*, "the opinion of some."

of all bodies; and which, if it did exist, must give resistance to the internal parts of bodies: he, in the first edition of his *Principia*, pronounces, from this experiment, against the existence of any such medium, because it gave no sensible resistance to the internal parts of bodies, of which he brings this experiment as a proof. But in the other two editions, he infers, from the very same experiment, that the internal parts of bodies suffer some resistance; which can be owing to no other cause, than the existence of a subtile medium ‡. And from the re-

‡ In the edition of 1687, after reciting the experiment, we have these words. *Est igitur resistentia pyxidis vacuæ in partibus internis quinquies millies minor quam ejusdem resistentia in externa superficie, et amplius. Sic disputamus ex hypothesi, quod major illa resistentia pyxidis plenæ oriatur ab actione fluidi alicujus subtilis in metallum inclusum. At causam longe aliam esse opinor. Nam tempora oscillationum pyxidis plenæ minora sunt quam tempora oscillationum pyxidis vacuæ, et propterea resistentia pyxidis plenæ in externa superficie major est, pro ipsius velocitate et longitudine spatii oscillando descripti, quam ea pyxidis vacuæ. Quod cum ita sit, resistentia pyxidum in partibus internis aut nulla erit aut plane insensibilis. Edit. 1726. Est igitur resistentia pyxidis vacuæ in partibus internis quinquies millies minor quam ejusdem resistentia in externa superficie, et amplius. Sic vero disputamus ex hypothesi, quod major illa resistentia pyxidis plenæ, non ab alia aliqua causa latente oriatur, sed ab actione sola fluidi alicujus subtilis in metallum inclusum.* Here are two contrary conclusions drawn from this same experiment; the one for, the other against the existence of an ethereal medium. Is arguing from experiments, then, so sure a method of philosophising, when the self-same experiment can prove direct contraries? and when, by a sleight of hand peculiar to philosophical jugglers, they may be turned to serve any hypothesis?

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sistence of mediums, he infers a vacuum, and the perpetual motion of bodies in it, by the *vis inertiae*, when they are once put into motion by the power of projection. And his system of the world in the third book, is built upon the principles laid down in the precedent ones. “ This philosophy
“ was first contrived in a popular way, that
“ it might be fitted to the capacity of ordinary readers, without the long train of
“ mathematic propositions, to which we are
“ every where referred; but, for prudent
“ reasons, it was put into the method we
“ now see it; namely, that it might not
“ be drawn into dispute. However, it confesses the whole depends upon the definitions, the laws of motion, and the three
“ first sections expressed in book 1.; which
“ definitions, and laws of motion, do entirely rest upon the suppositions of the
“ attraction of gravity, and a vacuum.
“ From whence it is manifest, 1st, That the
“ present philosophy itself, only argues
“ from the justness of its principles, and
“ not from the appositiveness of its solutions;
“ and, 2^{dly}, That it was conscious how
“ easily, in a popular method, it might be
“ controverted; which, if it really carried
“ mathematic certainty, and uncontrollable evidence with it, it could not be;
“ and yet, as it now appears invested with
“ lines, and intermixed with mathematic schemes

“ schemes and figures, the world is apt to
 “ surmise it has no less to support it ; con-
 “ trary to its own confession.”

But to return to the laws of motion, which
 are these.

L E X I.

*Corpus omne perseverare in statu suo quie-
 scendi vel movendi uniformiter in directum, nisi
 quatenus illud a viribus impressis cogitur statum
 suum mutare.*

L E X II.

*Mutationem motus proportionalem esse vi mo-
 trici impressæ, et fieri secundum lineam rectam
 qua vis illa imprimitur.*

L E X III.

*Actiōi contrariam semper et æqualem esse re-
 actionem : sive corporum duorum actiones in se
 mutuo semper esse æquales, et in partes contra-
 rias dirigi.*

Now, what is this but taking for gran-
 ted what ought to be proved, and making
 those the laws of motion which are only the
 effects ? The laws of motion are those causes,
 powers, or agents, which move and carry
 bodies, or by which they are moved or car-

ried. What these are, is the thing in question. The present philosophy picks up a few appearances, and would pin them upon us for the laws or cause of motion. Because we see a body continue at rest till put into motion, and continue its motion, when put into motion, till it comes to rest; will it thence follow, that these are the effects of some innate properties in matter, as the *vis inertiae*? and must we therefore conclude, that projectiles would perpetually persevere in their motions, were it not for the resistance of the air? May we not as reasonably conclude, that as matter requires some force to put it into motion, so it requires some continual impulse to keep it in motion; and that its motion continues till that impulse ceases to act upon it? But, after all, what is this same *vis inertiae*, but a mere cant word? The body moves, because it does move, is as good an axiom, and will help us to the cause of motion, as soon as his law, That a body doth not stop, because it hath no power to move itself. For to say that a body continues in motion, because it cannot stop itself, is as absurd in a philosopher, as it would be in a physician to say, his patient died, because he could live no longer. Besides, he owns, that “ the *vis inertiae* is a passive principle, by which
 “ bodies persist in their motion or rest, receive motion in proportion to the force
 “ im-

“ impressing it, and resist as much as they
 “ are resisted. By this principle alone there
 “ never could have been any motion in the
 “ world. Some other principle was ne-
 “ cessary for putting bodies into motion;
 “ and now they are in motion, some other
 “ principle is necessary for conserving the
 “ motion *.”

The point in question is, What powers or agents continue motion, after the *vis impressa*, that which first put the body in motion, is removed? What evidence is there produced to determine this point? His definitions and laws suppose some properties inherent in matter, which move it after the *vis impressa* has put it in motion: for, by definition 4. this *vis* is said to consist in action alone, and not to remain in the body after action, the body persevering in its new state by the *vis inertiae* alone. The first law supposes, that if a body be once projected, it will move itself ever after in a straight line, till something stop it, or divert its course. From hence they argue, that the planets move in spaces free from resistance; and, for proof of this, appeal to the abovementioned law. Now, what is this, but bringing two things in proof of each other, neither of which

* Optics, English edit. 1721, p. 372, 373.

are proved? To this it will be answered, That the cause of gravity and attraction is not here considered: what is called attraction may be performed by impulse, or by some other means unknown to them. This, though indeed a specious, yet is only a pretence, as I have proved above, given out to deceive unwary readers, to cast a mist before their eyes, and prevent their prying too closely. For if impulse by *æther* be allowed, (that subtle spirit he hints at in the end of the *Principia*, and to which, under the name of *æther*, he attributes attraction, and every thing, in his *Optics*), what will become of his *Principia*? Are not all his calculations, proportions, &c. made and suited to his imaginary power of projection, and a vacuum or spaces free from resistance, and consequently free from impulse? (for what cannot resist, cannot impel). When the whole of his book is to prove, that bodies do not move mechanically by impulse, is it not ridiculous and trifling to fly to impulse, a cause of motion he has so dogmatically rejected, and which is utterly inconsistent with, and destructive of his scheme? For if bodies move by impulse, the impelling medium must be in all places where the bodies are, and whither they are to be moved to; and as bodies may be moved in every direction, therefore the impelling medium must be every where. It is in vain therefore

to

to pretend, " that he has secured his philo-
 " sophy against any hazard of being dis-
 " proved or weakened by future discoveries;
 " that he has taken care to give nothing for
 " demonstration, but what must ever be
 " found such : and having separated from
 " this what he owns is not so certain, he
 " has opened matter for the enquiries of
 " future ages, which may confirm and en-
 " large his doctrines, but can never refute
 " them." For though the ingenious Mr.
 Maclaurin does thus endeavour to shore up
 the Newtonian edifice, it only shews, that
 he is conscious of its tottering condition, and
 that it stands in need of a buttress. For the
 doctrine of motion by impulse, and its con-
 sequence a plenum, must for ever destroy the
 doctrine of projection, gravity, and attraction,
 and their consequence a vacuum ; and also
 the *vis inertiae* of matter ; and of course his
 three laws of motion, which depend on
 them. Besides, if gravity and attraction are
 only used in general for any force by which
 bodies tend towards one another, whatsoever
 be the cause ; what necessity for a vacuum ?
 Why must the medium of the air be rejected ?
 a medium which all philosophers, down to
 our author, made the cause of motion, though
 they could not explain its effects, or shew
 how it acted. If he is ignorant of the cause,
 as he has sufficiently proved himself to be ;
 the air, for any thing he has said to the

contrary, may be the very medium he has rejected.

But to speak more closely to the matter, and to explain this first law of motion, on which the rest depend, I must observe, that as this system is full, and bounded, (according to the scripture-philosophy, which it is my design in these sheets to follow); and as one moiety of the matter of the heaven, the light, which is the purer and finer part, is in continual motion from the sun, the centre of the system, to the circumference; and the other moiety, the spirit, which is the grosser part, is in as continual a motion from the circumference to the centre: these adverse motions lay a pressure and stress upon every particle of the matter of the heaven itself, or the *ethereal fluid*, as I may call it, and also upon every thing placed in it. When therefore the ethereal fluid which surrounds the body, presses it equally on every side, the body is at rest, and continues so: when, by any accident, this equality of pressure is destroyed, motion ensues; and continues as long as the impulse behind is greater than the resistance before; or, to speak more strictly, until the impulse behind ceases to act, and the pressure on every side, behind and before, becomes equal. And this explains the *vis inertiae*, to which they attribute the continuance of a body in motion; and

and shews it to be an accident, and not a property of matter. For as all bodies exist in this plenum of the air, it is plain, that no one body can move without striking against, and moving away another, and so meeting with some resistance. The *vis inertiae* cannot be an essential property of matter, or a *vis insita*, as it is called by Sir Isaac Newton; because a body has a greater *vis inertiae* in some fluids than in others. In quicksilver, for instance, it is greater than in water; in water than in air; in the air than in the ether of Sir Isaac, that remains in the receiver when the gross air is drawn out; and which ether, by his own confession, has so little of the *vis inertiae*, as to give no sensible resistance to bodies moving in it: though resistance it must give, or there could be no motion; for that which gives no resistance, can give no impulse.

This *vis inertiae* is made the standing argument against a plenum; whereas we now see, that a plenum is the very cause of the *vis inertiae*: for if the parts of this aerial fluid were not continuous and contiguous *quaquaversum*, bodies would neither have resistance nor motion. But the particles of the heavens being pressed one against the other, and having no lurking holes or spaces big enough to creep into, are forced to fight their

their way, and act against each other: and to this conflict is owing all the resistance bodies give and receive. Whilst the conflict, in the line in which a body put into motion is carried, lasts, the body continues in motion; when peace is made between the contending parties, the body rests.

The most plausible, as well as popular objection to a plenum, is *the absurdity to suppose, that, upon the motion of every little atom, the whole frame of things must be disturbed, and set a-going.* But the whole frame of things is in a continual motion, and always a-going; the largest masses of the aerial fluid moving one way, the small ones the opposite way; the largest masses moving foremost, and the rest in order, and proportion to their size, towards the sun, the centre of the system; the smallest moving foremost, and the rest in proportion to their size, towards the circumference; except where they are restrained. And the action of movement is no more than each sliding or rolling upon or by another. And though this produces a motion of the parts, considerable, where the parts of the fluid are divided very small, or a considerable quantity of it is put into that condition; yet each part is shifted only a small distance from its place, furthest near the light, and less and less at greater distances; and every part finds its place of rest
again

again in a moment, or in two or three vibrations or rebounds, (which, when great, we call *echoes*), and come again to an equilibrium. So that any operation can be performed, or body moved, by moving part of the aerial fluid, proportionate to the particular action or motion, without disturbing the rest, and thereby removing other bodies that were not intended to be moved.

The same may be said of the other two laws. For as it is the impulse of the air which continues a body in motion, so it moves faster or slower in proportion to the force with which the air is pushed away : and motion will be in the direction of the right line in which the moving force is impressed ; because the lateral air prevents the body from diverging to either side, and makes a kind of groove or channel for it to move in ; and it is continued in motion until the resistance before become greater than the impulse behind.

And so of his third law : The atoms are pressed out from the sun, the centre, with the same velocity as the grains are pressed in ; and the firmament or airs resist, repress, or react against a body, as much as the body presses or acts upon the firmament or airs : so action and reaction are equal and contrary. But as these their laws are confessedly consequences

sequences of the *vis inertiae* of matter, and the *vis inertiae* has been shewn above to be a consequence of a plenum; they must likewise depend upon it, and will be best understood and explained when the laws of this fluid of the air shall be deigned worthy the philosophers enquiry and attention.

The second of the two great theories upon which the *Principia* turns, is the resistance of mediums to the motion of bodies. This comes next under consideration; for, to use the words of Mr. Fontenelle, “ Sir Isaac
 “ Newton has, as usual, deduced from the
 “ profoundest geometry the effects of this
 “ resistance, whether arising from the densi-
 “ ty of the medium, the velocity of the
 “ body moved, or the largeness of its sur-
 “ face;” and thence draws his conclusions, to prove that the heavenly motions cannot arise from, or be continued by the impulse of any medium. The late ingenious Mr. Cotes, in his preface, has judiciously summed up the evidence: and as his own great skill in mathematics, and his thorough knowledge of our author, sufficiently qualified him for the task; so his profound admiration of, and entire attachment to his scheme, leave no room to doubt, that he has done justice to his master, by placing every argument in the clearest and strongest light, and giving each
 its

its full weight. I shall therefore, to avoid any suspicion of misrepresentation, quote his own words.

Corpora progrediendo motum suum fluido ambienti paulatim communicant, et communicando amittunt, amittendo autem retardantur. Est itaque retardatio motui communicato proportionalis; motus vero communicatus, ubi datur corporis progredientis velocitas, est ut fluidi densitas; ergo retardatio seu resistentia erit ut eadem fluidi densitas; neque ullo pacto tolli potest, nisi a fluido ad partes corporis posticas recurrente restituatur motus amissus. Hoc autem dici non poterit, nisi impressio fluidi in corpus a tergo, æqualis fuerit impressioni corporis in fluidum ad partes anticas: hoc est, nisi velocitas relativa qua fluidum irruit in corpus a tergo, æqualis fuerit velocitati qua corpus irruit in fluidum; id est, nisi velocitas absoluta fluidi recurrentis duplo major fuerit quam velocitas absoluta fluidi propulsi; quod fieri nequit. Nullo igitur modo tolli potest fluidorum resistentia, quæ oritur ab eorundem densitate et vi inertiae. Itaque concludendum erit, fluidi cælestis nullam esse vim inertiae, cum nulla sit vis resistendi; nullam esse vim qua motus communicetur, cum nulla sit vis inertiae; nullam esse vim qua mutatio quælibet vel corporibus singulis vel pluribus inducatur, cum nulla sit vis qua motus communicetur; nullam esse omnino efficaciam, cum
nulla

nulla sit facultas mutationem quamlibet inducendi.

That is, “ Bodies in going on through a
“ fluid, communicate their motion to the
“ ambient fluid by little and little; and by
“ that communication lose their own motion,
“ and by losing it are retarded. Therefore
“ the retardation is proportional to the mo-
“ tion communicated; and the communi-
“ cated motion, when the velocity of the
“ moving body is given, is as the density of
“ the fluid; and therefore the retardation or
“ resistance will be as the same density of
“ the fluid; nor can it be taken away, unless
“ the fluid coming about to the hinder parts
“ of the body restore the motion lost. Now,
“ this cannot be done, unless the impressi-
“ on of the fluid on the hinder parts of the
“ body be equal to the impressi-
“ on of the fore parts of the body on the fluid; that
“ is, unless the relative velocity with which
“ the fluid pushes the body behind, is equal
“ to the velocity with which the body pushes
“ the fluid; that is, unless the absolute ve-
“ locity of the recurring fluid be twice as
“ great as the absolute velocity with which
“ the fluid is driven forwards by the body;
“ which is impossible. Therefore the re-
“ sistance of fluids arising from their *vis*
“ *inertiæ* can by no means be taken away.
“ So that we must conclude, that the ce-
“ lestial

“lestial fluid has no *vis inertiae*, because it
 “has no resisting force; that it has no force
 “to communicate motion with, because it
 “has no *vis inertiae*; that it has no force to
 “produce any change in one or more bodies,
 “because it has no force wherewith to com-
 “municate motion; that it has no manner
 “of efficacy, because it has no faculty
 “wherewith to produce any change of any
 “kind.”

Thus far Mr. Cotes.—Sir Isaac Newton, in his *Peregregia resistentiarum theoria*, after many experiments by swinging pendulums, and letting fall bodies from St. Paul's cupola, there at full recited, himself thus concludes.

*Projectilia utique motum cient in fluidis
 progrediendo; et hic motus oritur ab excessu
 pressionis fluidi ad projectilis partes anticæ, su-
 pra pressionem ad ejus partes posticæ; et non
 minor esse potest in mediis infinite fluidis, quam
 in aere, aqua, et argento vivo, pro densitate
 materiæ in singulis. Hic autem pressionis
 excessus, pro quantitate sua, non tantum motum
 cient in fluido, sed etiam agit in projectile, ad
 motum ejus retardandum: et propterea resisten-
 tia in omni fluido est ut motus in fluido a pro-
 jectili excitatus; nec minor esse potest in æthere
 subtilissimo, pro densitate ætheris, quam in aere,
 aqua,*

aqua, et argento vivo, pro densitatibus horum fluidorum.

That is, “ Projectiles excite a motion in
 “ fluids as they pass through them; and
 “ this motion arises from the excess of the
 “ pressure of the fluid at the fore parts of
 “ the projectile, above the pressure of the
 “ same at the hinder parts; and cannot be
 “ less in mediums infinitely fluid, than it is
 “ in air, water, and quicksilver, in propor-
 “ tion to the density of matter in each.
 “ Now, this excess of pressure does, in
 “ proportion to its quantity, not only excite
 “ a motion in the fluid, but also acts upon
 “ the projectile, so as to retard its motion;
 “ and therefore the resistance in every fluid
 “ is as the motion excited by the projectile
 “ in the fluid; and cannot be less in the
 “ *most subtile æther*, in proportion to the
 “ density of that æther, than it is in air,
 “ water, and quicksilver, in proportion to
 “ the densities of those fluids.”

Thus we find, that all their experiments, and their inductions from them, are calculated to prove a vacuum for the orbs to move freely in, and to prove that projection and gravity are the powers that move and continue them in motion. Sir Isaac has shewed how such a fluid as the air must act to continue motion; namely, that the impulse

pulse it communicates to a body behind, must be greater than the resistance it gives before; and has demonstrated, that if the fluid acts in this manner, motion will be produced and continued: but says, that experiments of falling bodies prove that this is impossible; and thence, and from the regular and lasting motions of the planets and comets, in all manner of directions through the heavens, concludes these celestial spaces to be void of matter. If now I prove, from two familiar instances, that the air moves bodies mechanically by impulse, and in the very manner he pretends to have proved mathematically and from experiments that it cannot move them; what hinders to conclude, that all the effects attributed to projection, gravity, and a vacuum, may be performed by the mechanical operations of the airs? At least, I hope it will be deemed a sufficient plea in arrest of judgment.

A ship under sail, is put and continued in motion by the air giving impulse behind greater than the resistance it gives before. It is carried forward, not by the imaginary power of projection, but by the continual impulses of the airs: and, to use their own expressions, "the lost motion is restored by
 "the fluid of the airs pressing in at its hinder parts; that is, the absolute velocity
 "of the airs impelling, is twice as great as
 G " the

“ the absolute velocity of the airs propelled.” The impulses of the air behind, overcome both the resistance of the air and water before; the ship is carried faster or slower, as the impulses are stronger or weaker; and in a sufficient wind, the impulses are so great as to overbalance both the force of the air before and the tide, even when running directly against it.

In the same manner, and by the same means, the sails of a wind-mill are kept in a constant gyration; and while the blasts of the air continue, they are whirled round, and swifter or slower in proportion to their strength. When the blasts cease, motion is also stopped, and ceases.

Do either of these bodies persevere in their motions by the first law? or do they lose their motion from being retarded by the resistance of the air before? Is it not the cessation of the impulsive force exerted upon them behind, that is the cause of their stop, or losing their motion? And when a ship or boat is carried by the current of the tide, the case is the same: As long as the current flows, motion continues; nor is the resistance of the water before, sufficient to stop motion, while the current continues to run. Would either of these bodies move *in vacuo*? Both continue in motion without being

being retarded by the resistance of the air ; both owe the continuance in their respective motions, progressive and circular, to the impulses (that is, in effect, to the resistance) of the air : for its impelling power is caused entirely by its resisting power ; and in a calm neither will move. And though he talks of the greater bodies of the planets and comets conserving their motions in less resisting spaces ; it is evident, that a ship, and the sails of a wind-mill, in such an unresisting medium, would lose all motion, and be becalmed.

Can it be said of either of these bodies, that they persist in their state of motion by the *vis inertiae* alone, after the *vis impressa* has left them ? And if this be not true of them, what reason have we to make a law of it, which supposes it to be true of all bodies without exception ? These are moved plainly by a force impressed from without, not by any internal principles of motion. And as these instances afford us a sufficient proof of the cause of motion being *ab extra*, why must we have recourse to any other ? Nay, by the same method of reasoning it may be demonstrated, that a ship, for instance, cannot be moved by the air in the manner it is : for the sails of the ship, in going on through the fluid of the air, commu-

nicate their motion to the ambient fluid by little and little, and by that communication lose their own motion ; and by losing it are retarded ; and the retardation is equal to the motion communicated : and this lost motion cannot be restored, unless the impresson of the air on the sails behind be equal to the impresson of the fore part of the ship and sails on the air ; that is, unless the relative velocity with which the air pushes the sails behind, is equal to the velocity with which the sails push the air ; that is, unless the absolute velocity of the recurring air be twice as great as the absolute velocity with which the air is driven forward by the sails ; which is impossible : and yet in spite of this impossibility the ship is driven forward. But it will be said, That the ship is pushed on by a current of air. And I answer, So may projectiles, and the earth and planets. And I hope to shew that this is the fact. In the case of a ship, and projectiles, the current is only temporary, and accidental ; in that of the orbs, the current is permanent and steady ; they sail in a pacific ocean, undisturbed by storms or tempests, and are carried in their courses by a current of air, exerting its propulsive force on their back parts, as regular and lasting as are their motions.

The fallacy of the matter lies here. The Newtonians suppose projectiles to continue their

their motions solely by the *vis insita*, the innate force of matter ; or the *vis inertiae*, the force of inactivity ; and that the air only serves to retard them : whereas they are as much pushed on by the current of air behind, as a ship is by the wind acting upon the sails. And the objection to bodies being moved by the air, is founded upon a like mistake, that the body can only be acted upon, by the air which the body pushes before it, recurring to the hinder parts. But the truth is, that the projected body drives before it the grosser parts of the air, and leaves a track of thinner behind ; into which the grosser parts of the air behind and near that track rush, and so make a current or stream of air, which pushes on the body, until the recurring and the lateral air fill it up ; and then motion ceases. But at the hinder parts of the earth and planets the current can never be filled up, or be stopped ; *labitur et labetur in omne volubilis ævum* ; as I shall shew when I come to treat of the cause of the motion of this our planet.

Here then are two cases, in both which it is evident to sense, that the same agent, the air, acts upon, puts and keeps bodies in motion, and that by giving impulse behind greater than the resistance it gives before ; which our philosophers have asserted to be impossible, nay pretended to prove it by what

they call *mathematical demonstrations*. When Sir Isaac Newton so very nicely calculated the resistance of the air, why did he not examine whether it might not impel, and so move bodies? Had this been done, he would not, from such loose premises, have concluded, that a body once projected, would move on *in infinitum*, was it not for the resistance of the air. Why did he omit taking into consideration that medium which he suspected to pervade the interstices between the pores of bodies, and whose existence, at the end of his *Principia*, he positively asserts, and in his *Optics* makes his *fac totum*? Is not this playing fast and loose with his readers? For surely so powerful a medium as he makes this to be, ought to have been taken into consideration when he was giving them the principles of natural philosophy.

I have shewn to demonstration, in the two instances of a ship and wind-mill, that one and the same agent, the air, acts upon them by impulse, and performs the actions mechanically, without the help of projection; and that the actions would cease, if the agent was taken away. Both these phenomena roundly contradict what they have pretended to prove mathematically, as they call it, and have so positively asserted with a *fieri nequit*. Why may not the same agent act in the same manner on the moving orbs,
carry

carry on, and direct their courses; as there is always a sufficient current of air at their hinder parts continually exerting there its impulsive force? This agent is proved to act upon the surfaces of this orb; therefore it is and acts upon the surfaces of every orb, and every atom of matter. And as it is able to perform all the actions attributed to projection, attraction, gravity, &c. why must it be set aside, only to make room for these imaginary powers? and this upon no better foundation than such suppositions as above, here shewn to be false; which, as they are false, all the consequences drawn from them will be so too. And his *Peregregia resisten-tiarum theoria* will be of no service. Mediums may resist, we see, and yet bodies move in them. The heavens may be full of a proper fluid, yet the planets may preserve their courses, and the comets ramble through the immense regions of what he calls space, as freely as ships traverse the wide ocean with their sails spread in a sufficient wind, or as the sails of wind-mills are turned round; and would both move perpetually, were the impulses of the air equable and constant; which is the case at the moving orbs.—As for what he has said about the fixed stars and comets, &c. any one may see it was to serve a turn, and what turn it was to serve. For he has banished the fixed stars out of his system, purely because

88 An ENQUIRY after

cause he did not know what to make of them, or keep them within it, without doing mischief to, and overturning his whole fabric. This appears from his own words, *Principia*, p. 527. *Ne fixarum systemata per gravitatem suam in se mutuo cadant, hic* (meaning his *Deus*) *eadem immensam ab invicem distantiam posuerit.* And so speaking of comets, he says, *Quam longissime distant ab invicem, ut se mutuo quam minime trahant.* He talks of supplying his sun and the fixed stars with comets by way of fuel; which shews, that he thought they stood in need of supplies; and that the sun emitting light continually without any supply, was an objection to his scheme. He says, too, that some fixed stars which before were so far burnt out as to be scarce visible, after having been recruited by a comet or two, have burned up clear and bright again, and been visible with an increase of lustre. How happily may a person, when he has once got a name, conjecture! Had any one else talked at this rate, he would not have been looked upon as acting the part of a philosopher.

I shall now beg leave to propose a few queries.

Query 1. If a small quantity of air in a bladder, when the pressure of the external air is taken off, expands itself, so as to burst
the

the bladder; what hinders our atmosphere from expanding itself into the empty space above it? Sir Isaac tells us, that a cubical inch of air is, by expansion, sufficient to fill all the orbits between us and Saturn. The expansive quality of the air is proved by the experiment of the bladder above. Our atmosphere is (as they say) forty-five or fifty miles high, and above and beyond it is nothing but empty space, or fine ether void of all resistance, such as remains in the receiver when they have made what they call a vacuum. Is not then our *atmosphere* exactly in the same condition and circumstances as the bladder in the exhausted receiver? What therefore hinders *this vast sphere of air* from expanding itself into, and filling their imaginary regions of space, which are void of all sensible resistance, so can give none to prevent it? According to their account of things, this ought to come to pass: which as it does not, doth it not disprove their account, and plainly shew, that something else, which they never dreamed on, must lay that weight and pressure on what they call our atmosphere; otherwise it would vanish away like smoke, and not be able to compress and keep things together, as their other experiments prove it does?

Query 2. Will not the proportion hold the same between the periodical times and distances

distances of the planets, if you double or halve them? Can this therefore be any certain rule to determine their distances?

Query 3. Dr. Halley, in his *Synopsis of comets*, annexed to Cunn's translation of Gregory's *astronomy*, vol. 2. p. 904. has these remarkable words. "Wherefore such transits of comets do afford us the very best means, though they seldom happen, to determine the distance of the sun and earth; which hitherto has only been attempted by Mars, in his opposition to the Sun, or else Venus in perigee, whose parallaxes, though triple to that of the Sun, are scarce any ways to be perceived by our instruments: whence we are still in great uncertainty in that affair." And Dr. Keil says, that the distance of the earth is at present not determined to a five-hundredth part of the whole, or to about an hundred and sixty-thousand miles. If then, after all our boasted knowledge, we are so uncertain about the earth's distance from the sun; how much more must we be in the dark about the distances of the fixed stars? the method of determining which depends upon the diameter of the orbit that the earth describes in the space of a year about the sun; and which depending upon the uncertain distance of the earth from the sun, must likewise

wise itself be subject to the same uncertainty. And since the calculations of the distances of the other planets depend upon the certainty of the distance of the earth from the sun, is it not imposing upon the faith of mankind, to make the proportion of the distances of the planets to their periodical times, a proof of the powers of gravity and attraction, when it is confessed, that these distances are uncertain and undetermined? And if the distances be unknown, how can it be known that the periodical times of the planets revolutions are in proportion to their distances?

Query 4. Does not the recedence of the finer, and precedence of the grosser parts of the air, from and to the sun, or what Mr. H. calls light and spirit, admit of ocular demonstration in the motion of those small bodies we call sun-beams? for they all move in the stream of light towards the window in a line towards the sun.

Query 5. Does not Sir Isaac Newton, by what he adds at the end of his *Principia*, *de spiritu quodam subtilissimo*, expressly ascribe the attraction of gravity, the attraction of cohesion, electrical attraction, the emission, reflection, refraction, inflection, and calefaction of light, vegetation and sensation, to the impulse and actions of this *subtile spirit*, as the universal

universal cause of all these phenomena? Does not this destroy all properties in matter, and prove them to be the effects of the agency of the light and spirit? By light I mean the separate atoms of the fluid of the air, or the finer parts, not only when they give the sensation of seeing and of colours, which effect they have upon the eyes only, when they come immediately from the sun, or by reflection or refraction from other objects in straight lines; (in which sense this great genius and philosopher alone considered light, which might mislead him to make it, and his subtile spirit, or etherial medium, different things); but as, without giving this sensation, these atoms or finer parts pervade, gravitate, and lie hid in bodies, and, with the spirit or grosser parts of the air, perform all those effects (which vary as the subject on which they act varies) by a regular uniform mechanism in the macrocosm and microcosm. “ And if those who unhappily
 “ spent their time in searching after ima-
 “ ginary properties in matter, that were to
 “ be the *fac totum* in nature, had, instead
 “ of that fruitless pursuit, bestowed their la-
 “ bour in searching after this much-neglec-
 “ ted volatile *Hermes* *, (the air), who has
 “ so

* *Hermes* is derived from the Hebrew הרמ *Herm*, with the addition of the Greek and Latin termination *us* and *es*; and

“ so often escaped through the burst recei-
 “ vers of the chymists, in the disguise of a
 “ subtile spirit, a mere flatulent explosive
 “ matter, and stole into the exhausted re-
 “ ceivers of our philosophers, in the dis-
 “ guise of a vacuum, a subtile spirit, subtile
 “ effluvia, fine ethereal medium, and such
 “ like ; they would then, instead of reaping
 “ vanity, have found their researches re-
 “ warded with very considerable and use-
 “ ful discoveries.”

Query 6. Since our philosophers † are
 constrained, by the force of repeated expe-
 riments, to confess the existence of the air
 in its smaller massulæ of light, and its lar-
 ger masses of spirit, their *matter of different*
degrees of subtilty, “ diffused *quaquaversum*
 “ throughout animal, vegetable, and mine-
 “ ral substances ;—to acknowledge its active
 “ existence, not only in their interstices,
 “ but their solid fixed substances ;—to own,
 “ that it is very instrumental in the produc-
 “ tion and growth of animals and vege-

and is the air, that is, the mixture of light and spirit, in
 which all mechanical power is lodged. And this is the
Hermetic philosophy which Pythagoras brought from Egypt
 into Greece ; and which, by annihilating the light and spi-
 rit, the *Hermes* of the ancients, we have almost lost. For
 although we have recovered one part of it, the motion of
 the earth, we are so far from the other, namely, the cause
 of that motion, that we have rejected the very medium
 which does the business.

† See Hales, Newton, Homberg, Boerhaave, Niewentyt,
 and others.

“ tables ;

“ tables ; and, at the same time, a very
“ powerful agent in the dissolution of the
“ same bodies ;—that it manifestly abounds
“ in all natural bodies, and is a very opera-
“ tive and active principle in every chymi-
“ cal operation ;—since light is allowed to
“ be their fine, subtile, ethereal, unknown
“ medium ;—to be every where actively
“ present, imparting different degrees of
“ life, heat, and motion, to the animal and
“ vegetable creation, as well as to the mun-
“ dane system ; without which the whole
“ would be one great, stupid, inanimate
“ mass ;” —since by this active element,
they grant, that all the phenomena of light,
animal spirits, muscular motion, fermenta-
tion, vegetation, and the rest of natural
operations, may be accounted for ;—and
since these are the result of their later
thoughts, most exact scrutinies, and most
diligent enquiries : —to what is it owing,
that they have made no further enquiries,
what it is, whence it comes, and whither
it goes ? how it gets into these bodies, and
how it acts there ? whether it may not, by
some mechanism, be so framed as to sup-
port and keep in motion its own parts, and
those of every thing else, and so be the
grand and universal agent in nature ? For
what reason can be assigned, since the light
and spirit are and act upon the surface of
this our globe, why they should not be and
act upon the surface of every orb, nay, up-
on

on every atom of matter? “ And why may
 “ we not, if this is the case, with good rea-
 “ son adopt this powerful and universal
 “ agent among the *Principia*, nay, as the
 “ first principle of natural philosophy, not-
 “ withstanding it has hitherto been over-
 “ looked and rejected by philosophers, as
 “ no ways intitled to that denomination?”

The gravitarian hypothesis is pressed with many difficulties; and the introduction of an ethereal medium, in order to remove them, does rather tend to the destruction, than support of it. For this hypothesis is built upon the supposed powers of *attraction*, *projection*, the *vis inertiae* of matter, and a vacuum. Bodies are supposed to be first put into motion by the power of projection, and to be continued in motion, after their given projection, by the *vis inertiae* alone: but as this motion would be in a right line, the power of gravity is supposed to draw them towards a point, as towards a centre; by which means the earth, and primary planets, are continually drawn from rectilinear motions, and retained in their proper orbits round the sun, the centre of their motion. And as bodies are supposed to suffer no resistance, but from the air; and as the planets and comets move with the utmost freedom, and preserve their motions without the least sensible diminution; it is thence inferred, that the celestial spaces must be utterly void of
 any

any resisting medium, and that there must be a vacuum. But if gravity be caused by the impulses of an ethereal medium, this medium must be a resisting medium: for otherwise it cannot be the cause of gravity by impulse; because if it have no resisting force, it can have no force to communicate motion, or to be the cause of gravity. And besides, the constituent parts of this medium must be in contact with each other: and this medium must be diffused every way from the sun to the orbit of Saturn, and beyond it, by their own confession; because the power of gravity is extended thither: and this is destructive of both a vacuum, and the *vis inertiae* of matter. For this medium which can *impel* with all that force which the Newtonians call *gravity*, must be able and sufficient also to *impel* with all that force they call *projection*, and to continue a body in motion with all that force or power which they call the *vis inertiae*, or *power of inactivity*. And, in fact, if gravity stand in need of this ethereal medium to free it from the imputation of being no better than an occult cause, or of acting by a charm or sympathizing power, without means, or the intervention of any other matter; the *vis inertiae* will require the same assistance to free it from the same imputation. I shall therefore lay before the reader the principles of the scripture-philosophy, and try whether

ther they will not declare unto us the power we have so long ignorantly worshipped under the above-named attributes.

P O S I T I O N I.

According then to the sacred philosophy, the air is a mixture of particles differing in size; which difference is occasioned by its component parts or atoms being made capable of adhering to each other, and so of being formed into masses or grains; which masses or grains also differ in size, as they consist of more or fewer atoms. These masses or grains are likewise capable of being split or divided by the action of fire, and so sent out from the fire in atoms; which atoms are pressed together again, and are made to adhere like quicksilver, when they are got to a sufficient distance from that action; or in some such manner as the particles of melted metal run together, and storken, as they grow cold, by the cessation of that action which kept them asunder.

P O S I T I O N II.

The mundane system (which includes the fixed stars, and is bounded) is full of this mixture diffused every where from the centre to the circumference; though the mixture is not equal in all places. Near
H and

and about the sun, the centre, it is mostly in atoms; near the circumference, it is mostly in grains: and on the side of the earth, and planets next the sun, it is also mostly in atoms or *massulæ*; on the opposite side it is mostly in grains, or large masses. The atoms and *massulæ* in motion or agitation are called *light*, *heat*, &c. The grains in motion are called *spirit*; a name by which all nations have agreed to call them: and this spirit is now, as it was at first, the instrument of impulse, and so of motion. The air we breathe is a mixture of light and spirit; though this mixture is unequal at different times and seasons, in the summer and in the winter, in the day and in the night, and as other accidents may affect it †.

POSI-

† The division of the air into atoms and grains, the one constituting darkness, the other light, is handed down to us by Lucretius, l. 4. ver. 338.

*E tenebris autem quæ sunt in luce tuemur,
Propterea, quia cum proprior caliginis aer
Ater init oculos prior et possedit apertos;
Insequitur candens confestim lucidus aer,
Qui quasi purgat eos, ac nigras discutit umbras
Aeris illus: nam multis partibus hic est
Mobilior, multisque minutiore, et magis pollens.
Qui simul atque vias oculorum luce replevit,
Atque patefecit quas ante obsederat ater;
Continuo rerum simulacra adapertha sequuntur,
Quæ sita sunt in luce, laceßuntque, ut videamus.
Quod contra facere in tenebris a luce nequimus,
Propterea, quia posterior caliginis aer*

Crassior

P O S I T I O N III.

At the centre of this system is the solar fire, which, as Empedocles calls it, is *πυρ*

*Crassior insequitur, qui cuncta foramina complet ;
Obsiditque vias oculorum, ne simulacra
Possunt ullarum rerum conjecta moveri.*

That is, “ If we are placed in the dark, we see objects that are in the light ; because, though the *concreted dark air*, which is nearer, first enters and takes possession of the open eyes, the bright *lucid air* immediately follows, which as it were purges the eye, and dissipates the black shades of that air : for this lucid air is by many degrees more *active, subtiler, and penetrating, and its constituent parts smaller*. This, as soon as it has filled the passages of the eyes with light, and *opened* those pores that the dark air had stopped before, the images of things conveyed in the light immediately follow, and *strike* upon the eye, and move the sight. But if we are placed in the light, we cannot discover objects in the dark ; because a flux of *dark and thicker air* follows the bright and thinner, which is nearest the eye, and *stops* up all the pores, and so *chokes* up all the passages of the eyes, that the images of things cannot be moved or received into them.”

Here Lucretius calls what Mr. H. names *spirit, dense, gross, concreted air* ; and says, that light is *bright, lucid air* ; making their difference to consist in the texture of their parts, the parts of the *one* being small, the parts of the *other* large ; and for that reason to cause different sensations, the one that of light, the other that of darkness.

And Ovid has a remarkable passage, where he says, that fire is attenuated air, and air is spissated, condensed, or concreted fire ; and that they are reciprocally changing their condition.

*In superos aer tenuissimus amicat ignes ;
Inde retro redeunt, idemque retexitur ordo,
Ignis enim densum spissatus in aera transit.*

Metamor. l. 15. ver. 247.

αθροισμα μεγα, the great collection (or mart) of fire. And this fire is supplied and supported, as culinary fires here, by the influx of the air or spirit, and the efflux of the melted air or light. The fuel of our culinary fires is only the stage on which, and the means by which the fire acts; the air in friction in its pores is the fire: but then this friction soon destroys its stage, and dissipates some parts of the fuel in flame and smoke, and reduces the rest to ashes or cinders. But the solar or central fire is either maintained solely by the influx of the gross air or spirit flowing in from every point of the circumference to a central point or focus, where it is dissolved, and put into that intense action; in some such manner as the rays of light, collected to a point or focus by a burning glass, are made to act the part of fire: or else God provided such a proper instrument or receptacle, as would abide and stand that violent friction of the matter of the heavens, without its parts being dissolved or dissipated. The matter of the heavens was first put into this action of fire by the immediate power of God; but is now kept up, supported, and continued, by the machine itself, by the mechanical operations of the light and spirit, in their opposite and contrary motions from centre

to

to circumference, and from circumference to centre *.

POSI-

* Lucretius talks too of light being pressed out from the sun successively, atom impelling atom, l. 4. ver. 186.

*Solis lux, et vapor ejus,
Propterea quia sunt e primis facta minutis:
Quæ quasi trudentur, perque aeris intervallum
Non dubitant transire, sequenti concita plaga.
Suppeditatur enim confestim lumine lumen,
Et quasi protelo stimulatùr fulgure fulgur.*

That is, " The rays and vapour of the sun, because they
" are composed of the minutest seeds, or of atoms, are ea-
" sily impelled forward through the intermediate air, (name-
" ly, through the returning spirit), the following urging or
" pressing on the part that went before: for one beam of
" light is instantly supplied by another, and every ray is by
" a continued impulse pushed on by another behind." He
talks also of the sun being supplied from all parts of the
universe; which supplies are collected in his body as into a
spring, from whence they flow in streams of light and heat:
which shews the broken traditionary vestiges of the sacred
physics, l. 5. ver. 592.

*Illud item non est mirandum, qua ratione
Tantulus ille queat tantum sol mittere lumen;
Quod maria, ac terras omnes cælumque rigando
Compleat, et calido perfundat cuncta vapore:
Nam licet hinc mundi patefactum totius unum
Largifluum fontem scatere, atque erumpere flumen
Ex omni mundo, quo sic elementa vaporis
Undique conveniunt, et sic coniectus eorum
Confluit, ex uno capite hic ut profluat ardor;
Nonne vides etiam, quam late parvus aquai
Prata riget fons interdum, campisque redundet?*

" Nor are we to wonder how it comes to pass, that so
" small a body as the sun," (which he makes no bigger than
it appears), " is able to emit so much light as to spread
" over the seas, the whole earth and the heavens, and to

αθροισμα μεγα, *the great collection (or mart) of fire.* And this fire is supplied and supported, as culinary fires here, by the influx of the air or spirit, and the efflux of the melted air or light. The fuel of our culinary fires is only the stage on which, and the means by which the fire acts; the air in friction in its pores is the fire: but then this friction soon destroys its stage, and dissipates some parts of the fuel in flame and smoke, and reduces the rest to ashes or cinders. But the solar or central fire is either maintained solely by the influx of the gross air or spirit flowing in from every point of the circumference to a central point or focus, where it is dissolved, and put into that intense action; in some such manner as the rays of light, collected to a point or focus by a burning glass, are made to act the part of fire: or else God provided such a proper instrument or receptacle, as would abide and stand that violent friction of the matter of the heavens, without its parts being dissolved or dissipated. The matter of the heavens was first put into this action of fire by the immediate power of God; but is now kept up, supported, and continued, by the machine itself, by the mechanical operations of the light and spirit, in their opposite and contrary motions from centre

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Et quasi protelo stimulat fulgure fulgur.*

That is, “ The rays and vapour of the sun, because they
“ are composed of the minute seeds, or of atoms, are ea-
“ sily impelled forward through the intermediate air, (name-
“ ly, through the returning spirit), the following urging or
“ pressing on the part that went before: for one beam of
“ light is instantly supplied by another, and every ray is by
“ a continued impulse pushed on by another behind.” He
talks also of the sun being supplied from all parts of the
universe; which supplies are collected in his body as into a
spring, from whence they flow in streams of light and heat:
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Nam licet hinc mundi patefactum totius unum
Largifluum fontem scatere, atque erumpere flumen
Ex omni mundo, quo sic elementa vaporis
Undique conveniunt, et sic coniectus eorum
Confluit, ex uno capite hic ut profluat ardor;
Nonne vides etiam, quam late parvus aquai
Prata riget fons interdum, campisque redundet?*

“ Nor are we to wonder how it comes to pass, that so
“ small a body as the sun,” (which he makes no bigger than
it appears), “ is able to emit so much light as to spread
“ over the seas, the whole earth and the heavens, and to

P O S I T I O N IV.

This machine acts, and performs all the æconomical operations of nature, by this one simple process, namely, by the grosser air or spirit being pressed in from the circumference of this system among the finer ether or light about the sun, the centre, and by that means expanding those; and by the finer ether or light being pressed out among the grosser parts, in its way towards the circumference, and by that means expanding these; and this action and reaction is mutual and reciprocal, equal and contrary. And this mechanism is supported in its vigour, unimpaired or weakened by its continual action, by the gross air or spirit being split into atoms, as it is pressed from the extremity or density towards the central fire; and by the finer ether or light being compressed into grains, as it is pushed towards the circumference. By means of which reciprocation of action at the centre

“ cherish all things with its kindly heat: for you may imagine, that, from the sun, one large fountain of light breaks out, and flows abundantly over the whole world; and that the seeds of fire from all parts of the universe meet in the body of the sun, and are there collected as into a spring or reservoir, from whence the heat is diffused abroad. Do not you observe how widely a small fountain of water spreads its stream over the meadows, and overflows the fields?”

and circumference, the parts of the heavens will be always rarer and rarer as you approach the centre, and grosser and grosser as you approach the circumference or verge of this system; whereby this aerial or ethereal medium will suffice to impel bodies from the denser parts of the medium towards the rarer, with all that force which we call *gravity*, as Sir Isaac Newton himself admits in his *Optics*. And this is that vivifying principle at the sun which he saw was so necessary to continue motion in a plenum. And which being admitted, a plenitude of matter, from his own confession, is no objection to motion, but the cause of it. For by the gross parts of the heavens or airs being reduced to atoms by the action of the sun, the centre, and these atoms adhering into grains by the compressure at the circumference, by a constant alternacy; the constituent part of the heavens or air can never be reduced to an equilibrium, and so become quiescent; which is made an objection by Sir Isaac, and that a just one, to the Cartesian vortices. For the mechanism of the heavens is so nicely adjusted, that the very effort they make towards an equilibrium, is the cause of a perpetual motion: for the gross parts or grains of air being pressed among the finer, in order to restore an equilibrium, are by the pressure of those behind pushed into the sun, and there re-

duced to atoms, and issued out thence by the continual influx of the masses or grains of air; and this keeps up the action of fire at the centre. And the atoms thus issued out from the sun, are pushed by succeeding ones towards the circumference, to restore an equilibrium there, and in their way are reformed into grains or masses. And as this system is full, and bounded at the extremity, the atoms, thus formed into masses or grains, must push out other masses or grains from the circumference towards the sun: and so there will be a continual efflux of atoms, finer air, or light, in every direction from the sun, the centre; and a continual influx of grosser air, masses, grains, or spirit, from the circumference. I shall in the next chapter apply these principles to explain the motion of the earth.

C H A P. II.

Of the agents that move the earth.

THE Newtonians, in order to account for the motion of the earth round the sun, have nothing to do but to suppose a projection given in a right line, (when or how, they do not tell us), and attraction, or a *vis centripeta*, to draw it continually from that right line of its first projection, into an orbicular one. But the giving names to the effects of the air's agency upon matter, such as gravity and attraction, and the like; and then assigning these names as the agents, (for to say the sun attracts the earth, &c. is to make attraction an agent), is by no means, I think, philosophical: and the solving phenomena by these terms, is, in my humble opinion, rather veiling than unveiling nature. *Illud ergo proprie quæritur, (says Cardan), an motus aliquis inveniri queat, qui, citra novam generationem, causam in se contineat suæ continuitatis?* This is the philosophy I am for reviving, and thereby restoring the power and cause of motion to its ancient throne, wherein the world, till lately, universally acknowledged

ledged it to be placed, and wherein it really is, namely, the airs, the שְׁמִי, *Shemim*, the *placers*, *disposers*, and mechanical rulers, under God, of all nature : for in them, and by them, we live and move ; but from God, both they and we received our being.

Though from observation, that a planet performs its course in a circular orbit, you may very safely pronounce of it, that in so doing it must needs be subject to both a *centripetal* and *centrifugal* force ; yet there is not an equal necessity to pronounce, that this force is placed within the body around which the other moves : for it may be an impulse from without. And if at last we are to have recourse to impulse, may not the grosser air, or spirit, which, in its return to the sun, must impinge upon the back part of the earth, be the *vis centripeta* ; and the lateral impulse of the spirit at the confines of the circle of light and darkness, continually exerting itself, be the *vis projectiva*, or *impressa* ? I would humbly therefore propose these agents to the candid consideration of the Newtonian reader, if any of these gentlemen shall vouchsafe to become my readers ; begging of them coolly and impartially to enquire what these can perform, rather than rest in my account of them ; and where-ever I am thought to be mistaken, or may really be mistaken, to attribute

tribute this rather to my want of abilities, than to the insufficiency of the agents to execute their office ; and to examine *quid valeant cæli, quid ferre recusent.*

Let us next consider the Newtonian account of the manner of the earth's revolution round the sun, and the appearances arising from thence.

Let the strait line KL (*Fig. 1.*) be the projection of the earth's orbit, *Fig. 1.* (whose plane is coincident with the plane of the ecliptic ☊ ☋), viewed edge-ways, or with the eye in the plane of it, and opposite to the point M, near the middle. The point M will be the projection of that diameter of the ecliptic which passes through the equinoctial points, and also through the centre of the sun, supposed to be placed between them, viewed, as it should be in this projection, end-ways. L and K will therefore represent the two solstitial points of the ecliptic ☊ and ☋ ; L, that in which the earth is at our summer, *viz.* that of Capricorn, from whence the sun must of course appear at ☊, Cancer ; and K, that in which the earth is at our winter, *viz.* that of Cancer, from whence the sun must consequently appear at ☋, the contrary tropic, or that of Capricorn. The circle BQAE represents the earth : of which AB is

is the axis, round which it performs its diurnal rotation; B the north pole, A the south pole; and consequently EQ, which stands at right angles to it, and passes through the centre C, must be the æquator; and *op* is the circle which divides the enlightened hemisphere from the dark, seen edge-ways, or with the eye in the plane, which makes it appear like a right line. The position which the axis BA bears in regard to the plane of the ecliptic, and consequently to the plane also of the earth's orbit, (coincident with the ecliptic), is, that it makes an angle with it of $66^{\circ} 30'$; one half of it, from B to the centre, lying on one side, (the upper side, if you please, because we call B the north pole uppermost, as being nearest our zenith); the other half, from A to the centre, on the other side; and, consequently, the centre itself in the very plane of the ecliptic. Now, as it is carried round in the orbit from L to M, (on the other side of the sun), from M to K, from K to M, (on this side the sun), from M to L again, it constantly preserves this angle invariably the same; the centre C describing an elliptical orbit KL, in the very plane of the ecliptic itself, (represented by $\infty \infty$); the pole B describing a line parallel to it, at the distance of $66^{\circ} 30'$ above it, *viz.* BBB; and the pole A describing another parallel line,

line, at the distance of $66^{\circ} 30'$ below it, *viz.* AAA; the pole B never approaching nearer to it, or receding farther from it, on one side, nor, consequently, the pole A on the other; and every other point between B and A, as *w*, describing its respective parallel to the ecliptic, at the same distance from it at which itself is placed, *rrr*, and *sss*, as regularly as the centre itself does the orbit itself KL, in the plane of the ecliptic $\odot$ *w*; — which is saying, in other words, that the axis AB, in whatever part of the orbit you suppose it to be, whether in the solstices, or equinoxes, or any other intermediate point, remains constantly parallel to itself, pointing always, as to appearance, towards the same parts of the heavens, just as you see it represented in the figure; excepting only that extremely small deviation from perfect parallelism which occasions the precession of the equinoxes. The consequence of such a motion as this is, that when the earth is at L, or in *w*, the sun must appear at $\odot$ in the summer solstice, and illuminating the hemisphere *oBQp*; and the north pole B must be $23^{\circ} 30'$ within the light hemisphere, divided from the dark by *op*, *viz.* *oB*; and the south pole A must be at the same distance within the dark hemisphere, *viz.* *pA*. And when the earth is at K, the sun must appear in *w* in the winter solstice,

and

and illuminating the hemisphere $oEA\phi$; and the south pole A must be $23^{\circ} 30'$ within the light hemisphere, as ϕA ; and the north pole B, as far within the dark oB ; and at the equinoxes both poles must be barely illuminated. This accounts for the seasons as intelligibly as the rotation round the axis does for the days and nights.

And whereas the orbit is not a circle, but an ellipse, the point M does not exactly divide the line KL into two equal parts, but the distance MK is less than the distance ML; therefore the earth must take up more time in going from M to L, and thence to M again, *i. e.* from the vernal to the autumnal equinox, which it goes in the summer time, than it does from going from M to K, and thence back again to M, or from the autumnal to the vernal equinox, which is the path it describes in the winter; and so the summer must be longer than the winter.

How easy, how natural is this account! how agreeable to fact and observation! cry the Newtonians.—We go not about to deny the account, but how are we particularly obliged to the Newtonian principles for it? The earth hath been observed to move in such and such a manner; and if it moves in this manner, such and such phenomena will

will follow. But what causes it to do so, should have been the business of our philosopher's enquiry, and the question his principles should have resolved.

Here is nothing explained; nor do I see that we are any ways beholden to the new theory of gravity or attraction, except it be to retain the earth in its orbit.

It is well observed by Dr. Roger Long, in his astronomy, " That these motions of
 " a globe, that is, the rotation and pro-
 " gression of the earth, are supposed by
 " the Newtonians to be *in vacuo*, and not
 " in a medium where they meet with
 " any friction or resistance; for then the
 " axis of rotation might be changed, ac-
 " cording to the different impulse of the
 " medium upon its surface. Now, this is
 " the case (adds he) of the earth and pla-
 " nets, in their revolutions round the sun,
 " that they move in spaces void of all re-
 " sisting matter; or if it has any resistance,
 " it is so small as not to have any sensible
 " effect in many ages."

The reader will, I hope, be so candid as to consider, that the present account of the motion of the earth round the sun, owes its easy solution, to having little or
 nothing

nothing to account for ; and that my account, should I be so happy as to express myself to satisfaction, must seem more complicated and laboured ; not only by reason of its novelty, which in opinions meets not with so free a reception as in fashions, but because I have this resisting medium, the air, which they have rejected, to encounter ; and to shew how, by its different impulses, it retains the earth in her orbit, and gives her diurnal and annual motion. And this I shall attempt to shew to the best of my abilities.

But as the wisest of men, and the greatest naturalist, completed by the spirit of prophecy, (for so I hope, without offence, I may call Solomon), has left us a noble description of the agents which move the earth, I shall beg leave to premise his account, which he gives us, *Eccles. i. 4.* דור *Generation* הלך *comes on*, ודור *and generation* בא *goes off*: וארץ *but the earth* לעולם *to the end* עמרת *endures*. וזרח השמש *For which purpose the solar light springs up*, ובא השמש *and the solar light goes off*; ואל מקומו *and at (or into) its place (or station)* שואף *drawing in the spirit* זורח הוא שם *springing up thence, (or giving way to what is sucked in, viz. to the spirit)*: אל-דרום *coming on to the south*, וסובב *and circuiting round* אל צפון *to the north*; סובב סבב *circuiting in a circuit,*
(or

(or going its round), הולך הרוח *the spirit is successively coming on*, ועל סביבתיו *and upon (or in) its (the light's) circuits* סב הרוח *the spirit reverts.*

I must observe, that the word זרח has no more relation to *rising*, than בא has to *setting*, saving that part of the solar light is alternately above and below any one country or part of the earth, as a man terms the side he is upon uppermost. And so the sacred penmen use it for the going in of the solar light from the opposite hemisphere, into the hemisphere, and so country, where the writer lived, or of which he is speaking. And they use בא for the going off of the solar light from the hemisphere, and so country, where the writer lived, or of which he is speaking, into the opposite hemisphere. And שאף is, as it is constantly rendered, *the drawing in, or admission of the spirit.*

The royal author is here shewing, that every thing is subject to the heavens, the air, in its three conditions, of fire, light, and spirit, of which the שמש solar light is the principal agent and ruler in this system. He is not, as translated, treating of such, comparatively, small actions, as winds blowing, but of the *circulation of the circulators,*

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the

the airs, which produce and regulate the motion of every thing that moves, in the heavens, the earth, and the waters upon and under the earth. And he shews how the circulation of the heavens, the *conversio cœlorum*, as Macrobius calls it, supplies the race of men, in their several successive generations, with proper necessities, to the end of the world. And though these agents are themselves in a continual fleeting state, yet the support of man is owing to their fluxions. And, first, he tells us, generations are brought on, and generations are carried off; but the earth, for the use of all generations, is supported in all its conditions, motions, and courses, in its rotation, declination, and circular progression. Next he informs us, in order, how, and by what agents, this is performed. The שמש or solar light springs up from the אלה atbth, or fire of the sun, and goes forth as a bridegroom from his chamber, and as one made strong to run his race; and in his way hits against the earth in a cone of light, whose base covers one whole hemisphere, having its vertex at the sun. But this light would continue upon one and the same hemisphere, and neither rise up on the one, nor go off the other, unless the earth, by being turned, shifted it on to another part of its surface, which, before that, was dark, and
turned

turned as much of the dark part into the light, in order to make days and nights ; or otherwise, the point from whence the stream of light proceeds, must move round the earth. But this point, the orb or *atbth* of the sun, is at a vast distance from the earth ; is neither upon it, nor can act but where it is present ; and what is here spoken of, is said to be upon, and to act on the earth ; to come on, and to go off ; and *at its station to draw in the spirit*. Whence it is evident, that it is the solar light, and not the orb of the sun, which is here said to move ; and consequently, as the orb from whence the solar light proceeds, is fixed, this proves that the earth is moved. The first part of the description relates to the rotation of the earth, whereby the solar light alternately comes on and goes off. The second concerns the annual course of the earth, or the tropical year from equinox to equinox ; whereby the solar light springing up from *Libra*, the autumnal equinox, goes to the south, turns round to the north, and circulates round to *Libra* again ; and the spirit, pursuing the light in its circuit, impels the earth round from equinox to equinox. The word סבב used here, has much the same sense as *τρεπω*, from whence is derived *tropic*.

But it may be asked, Why is it not expressly said that the earth moves? To which I answer, That if there were any such properties inherent in matter, as those with which our philosophers have lately invested it; or could bodies, once projected, continue themselves in motion by innate virtues, without any impulse from without continually acting upon them; then, indeed, it might be proper to attribute motion directly to the earth: but if the earth cannot move one turn, either in its rotation or progression, further than the light and spirit direct, and give it motion, as will be shewn by and by; then it is more proper, I presume, to name the *agents*; because, saying that they act upon the earth, which is passive, and that they *rise* and *set*, as we term it, and go to the south, and so to the north; is not only saying that the earth moves, but that they move it. The light is the ruler, the director of the spirit's impulse; the spirit is the driver, the impeller; and the earth is the patient.

The body or sphere of the earth intercepts a column of light and darkness, and by that interception puts each into a condition different from the rest of the air or firmament where the earth is not: for it
thereby

thereby divides the light from the darkness, or, to use the more emphatical Hebrew phrase, between the light and between the darkness, taking from one and giving to the other, which before this interruption were mixed each with the other ; and the light thereby becomes more agitated and active, and the spirit more compressed, and ready to rush with greater force into the light where it is thinnest, or in the greatest agitation. And as the body of the earth is so large, solid, and thick, as to resist and reflect, perhaps as much or more light than what pervades it, and has a surface so broad, that the spirit on each side cannot break in, the force or action of each will be increased, and their condition altered from what it is in the other parts of the firmament. The parts of light which do not pervade or enter the pores of the earth, will be reverberated, and put into that degree of agitation or bustle which we call *day*, and is expressed in the Hebrew יום, from the verb המה *tumultuatus fuit, fremuit, &c.* ; which forms what Mr. H. calls *a cap of light*, which will be deepest in the middle, and thinnest at each edge. Now, the spirit can only push into the light at one of the edges of the cap of light, because it cannot pervade or pass through the body of the earth ; and as the earth's motion is from

west to east, this shews that the force or impulse * of the spirit is exerted at the western or evening edge.

There are therefore two forces or impulses, as I conceive of the matter, concerned in the diurnal and annual motion of the earth, or in its rotation round its axis, and in its progression round the sun ; or, if you please, the impulse of the spirit is exerted in two different directions. The grains of the spirit, in their descent to the sun from the circumference, turn, or שואף are sucked in by the light at the evening-edge of the line which divides light and darkness, at the cap of light ; and thereby pull the western edge from the sun, and turn the eastern edge towards the sun ; and so roll the earth round from west to east, and give it rotation round its axis : While the spirit at the evening-side of the earth, pushes in a lateral direction parallel to the circle which divides the enlightened hemisphere from the dark one, and in the direction of the plane which divides light and darkness, and so impels it forward in

* As I find that a late writer on mechanics defines *impulse* to be a momentary force, I beg leave to acquaint the reader, that I use not the word *impulse* in this sense, but for a *constant* and *equal*, or an *uniform accelerative force*, and crave his licence for this usage of the word in these sheets.

that plane, and gives it progressive motion. And as the plane which divides light and darkness, is always in the path of the ecliptic, as appears by *Fig. 2.* which is an orthographic projection of the earth in its annual orbit through the four cardinal points, where the direction of the impulse at the solstices is perpendicular to the direction of the impulse at the equinoxes, and must vary and make different angles in the intermediate points; so the earth must consequently be always impelled, and so carried round in the ecliptic. Let *eSg* (*Fig. 2.*)

be the cone of light, and *eig* the *Fig. 2.* cone of spirit or darkness, and *l* the cap of light; these two cones cover each an hemisphere of the globe of the earth, which is inclosed between them; and the line *eg* is the boundary of light and spirit, or the common basis of these two cones. The grains of spirit then in the line *fe*, in their descent to the sun *S*, turn into the cap of light at *e*; which cap being opposed to the action of the light from the sun, and the masses of the spirit behind the earth being hindered from mixing with the light by the interposition of the earth (as above observed), is filled with light; and the reaction of its particles divides those masses of spirit they find there, keep out the grosser parts on each side, and form, comparatively to the rest of the neighbouring parts of the

firmament, what is now called a vacuum: and the spirit thus turning or rushing in at *e*, pulls *e* from the sun, and turns *g* towards it; and thereby gives the earth rotation round its axis: and at the same time the spirit in the lateral direction *ke*, pushes into the cap of light, in the said direction, and impels the earth forward in the line *eg*; and the direction or application of this impulse of the spirit, varies as the line *eg*, which is the boundary of light and spirit, varies.

At the equinoxes, the circle which divides the light and dark hemisphere of the earth, or the solar horizon, as we may call it, cuts the equator at right angles in $r \simeq$, and coincides with the poles of the globe. But it stays not in this position: for the solar light, or *shemish*, as the scriptures term it, springs up thence, and declines to the south, (as Solomon says, taking the earth to have been created at the autumnal equinox); and the circle of illumination, or the solar horizon, begins gradually to change its position. It no longer coincides with the poles, as before, but cuts the centre of the earth, and makes an angle; which is continually increasing until it amounts to $23^{\circ} 30'$. And this consequently varies the push or impulse of the spirit, which acts in a line which lies in the plane of the solar horizon, or circle
which

which divides the light and darkness ; and which varies as that circle varies ; and as the plane of that circle lies constantly, during the earth's annual revolution round the sun, in the ecliptic, the push or impulse of the spirit must propel the earth in the ecliptic.

If it be asked, When the earth is at equinox, and the solar horizon is bounded by each pole, why the spirit does not impel in the plane of that circle, and so carry the earth forward in the equator ? I answer, So it would if the push continued in the same direction. But the pressure of the spirit on the back of the globe, (which tends towards the sun in a line which extended would pass through the centre of the earth and the sun, and which is always perpendicular to the plane of the circle of illumination, or solar horizon) ; this pressure, I say, alters, every moment, the circle of illumination, or solar horizon, in the plane of which the progressive impulse is exerted ; and consequently varies the push of the spirit. So at the solstices, the earth will, by the same means, be brought to equinox again : for the same pressure of the spirit at its back, or darkened hemisphere, will shift the solar horizon, or circle of illumination, in such a manner as that the light will gradually withdraw itself from each pole ; and the lateral or progressive impulse of the spirit, which follows the
direction

direction of the light, that is, propels in the plane of the solar horizon, or circle of illumination, will bring the earth to equinox.

To continue motion in a fluid, it is necessary that the impulse behind the body moved, be greater than the resistance before; and if this can be done, it is allowed that motion may be perpetual. Now, if we consider the state of the air before and behind the earth, we shall see that this must always be the case in every part of the earth's orbit. For the light and spirit before the earth, are in the common condition or mixture of grains and atoms, whereby the resistance they give is greatly diminished to what it would be was the spirit in the same condition it is at the back, or dark hemisphere of the earth, where the light or atoms are separated from it, and prevented to mix with it by the intervention of the earth's body. And the light and spirit behind the earth, where the impulse is exerted, are in quite an opposite condition to that before it: for the earth, in its progressive motion, is continually shifting off, or turning behind it, a column of light, which has been in the greatest agitation, and a column of spirit which has been most compressed; the one having just been in the inactive state of darkness we call *night*, and the other in that

that active state of light we call *day*. The air, too, which the earth in its progression pushes against, will recede through the cap of light, turn in behind into the thinned air, or vacuum, as I may call it, formed there by the means above mentioned, and heighten the propulsive force. Add to this, that the side of the earth which is constantly opposed, by its rotation, to the impulse of the spirit, is that which has been all along heated by the action of the sun upon it, and received its whole accumulated heat from sun-rise to sun-set; whereas the side of the earth which goes foremost, is that which has all along been objected to the spirit in its condensed state, and received its whole accumulated cold from sun-set to sun-rise. So that there constantly will be the greatest friction and heat at the evening-edge, and consequently the greatest and strongest impulse of the spirit at that part. All which things being taken into the account, it will appear, that there must continually be what is called a vacuum formed behind the earth, and an impulsive action kept up there, sufficient to overcome the resistance before, and so move the earth; the lost motion, as it is termed, being constantly restored by the spirit rushing in at the hinder parts of the body of the earth; and the absolute velocity of the push of the spirit at the hinder part of the earth being

being twice as great as the absolute velocity of the air pushed away by the fore part of the earth in its progression: which air so pushed away, as already observed, moves backward into the vacuum of divided æther behind the earth, heightens the action there, and thereby contributes to renew and increase the projectile or impulsive force of the spirit.

Projectiles are retarded and lose their motion in the open air, because the spirit or gross air at the sides of the current made by their projective force, rushes into that thinned space or channel, and soon fills up the vacuum, or makes the mixture equal. What I mean, is, that a body projected drives away before it the grosser parts or masses of air, and leaves a track behind it which is thinner and finer, which makes a comparative vacuum in relation to the adjacent parts where the finer and grosser parts of air are more equally mixed; and into this vacuum or thinned space the spirit adjoining to the vacuum rushes in, as does also the air pushed away by the projectile, and so moves the body. And while the vacuum continues, the body continues in motion; because the spirit can rush into it with sufficient force to impel, or be the *instrument of motion*. But this motion becomes more and more languid,
as

as the vacuum * is filling up ; and when it is filled up, and the space becomes near an equal mixture of grains and atoms, then the body

* I hope the reader will be so candid as to take the term *vacuum*, where-ever I use it, in the sense I intend it should be taken, namely, for a space filled with the finer and smaller parts of the air, the larger and grosser being driven out by some means or other, as the motion of the hand, the action of fire in the firing of gun-powder, or in any other manner. I make use of the word in compliance to custom, and in hopes my meaning may be more inoffensively communicated, and easier comprehended, by the use of this word, than by the terms *light*, or *thinned air*, or any other of the Hutchinsonian expressions. A vacuum, then, in my sense, is a place wherein is somewhat of less density and resistance than there is in the circumjacent places, and which will be squeezed out by, and give place to the pressure of the grosser parts, until the place be all filled with the grosser parts, or become an equal mixture of the grosser and the smaller. And in this sense I apprehend the word *vacuum* to have been anciently taken. For I think Lucretius, construed by himself, means nothing by his *vacuum*, but *rarior aer* ; and he no doubt expresses, by his *vacuum*, the *το κενον* of his master Epicurus ; and Epicurus, we may presume, took his *κενον* in the sense it had been anciently used. Lucretius, speaking of the loadstone and iron, says,

Hoc ubi inanitur spatium, multusque vacessit

In medio locus : extemplo primordia ferri

In vacuum prolapsa cadunt, conjuncta. l. 6.

Here he teaches, that the space between the loadstone and steel being thinned or rarefied, and so a vacuum made by the grosser air being dispersed and driven away, the corpuscles of the steel fall suddenly in a train, all linked together, into this vacuum, and draw with them the ring to the stone. So again,

Hæc quoque res adjumento motuque juvatur :

Quod simul a fronte est anelli rarior aer

Factus, inanitusque locus magis, ac vacuatus ;

Continuo

body returns again to rest. In proportion to the extent and degree of the vacuum made by the projectile force, the velocity of

*Continuo fit, uti qui post est cunque locatus
Aer, a tergo quasi provebat atque propellat.*

Trudit et impellit, quasi navim velaque ventus.

Here he says, that the air before the ring being made rarer, and the place thereby made an *inane* or vacuum, it immediately happens, that the air placed behind, pushes at its back, and drives the ring to the stone, as a ship is driven by the wind and sails. And yet again,

*Denique res omnes debent in corpore habere
Aera, quandoquidem raro sunt corpore ; et aer
Omnibus est rebus circumdatus appositusque.
Hic igitur penitus qui in ferro abditus aer,
Sollicito motu semper jactatur, eoque
Verberat anellum dubio procul, iret ut intus
Scilicet : atque eodem fertur, quo præcipitavit
Jam semel : et vacuum in partem conamina sumpsit.*

Here he tells us, that the air surrounds and lies hid in the pores of all bodies ; and that the air which lies hid in the pores of the steel, is in continual motion forwards, and so strikes upon the ring as if it would enter it, and cannot ; and so is carried towards that part which is rendered most void and empty.—Air Hutchinsonian, was he to write in Latin, could scarcely express his sentiments more fully. And further, to convince us that he uses the words *vacuum* and *inane* only for *rarior aer*, and not in the modern sense of them, let these two lines speak.

*Et quasi multa brevi spatio submittere debet
Lumina sol, ut perpetuo sint omnia plena. l. 4.*

Edit. Nardii, 1647.

“ The sun ought to emit many rays in an instant, that
“ there may be kept up, perpetually, an *absolute plenum*.”
Can any words be more decisive for a plenum ? The word
vacuum

of the body is increased, and therefore it continues the longer in motion ; because in proportion to the quantity of the air that is pushed away, and to the force with which it is pushed away, the longer time it will take in returning into, and so filling up the vacuum ; or the longer the mixture will be in becoming equal. And so the pressures on all sides of the body are the longer in coming to an equilibrium.—Thus, in the firing of cannon, the air is divided by the action of the fire to a great degree, and to a great distance ; and the gross particles are drove away with a prodigious force, so as to break windows at some distance. And I have been informed by a gentleman present in our late wars in Flanders, that men have been beat down by the blast or waft of the ball in its course ; that is, as I suppose, by the air pushed away on each side to make way for the ball. And the heated or fired air behind, which makes the vacuum, and into which the spirit pushes and drives the ball, pursues it for some time, in the likeness, as I take it, of a faint blue flame, like that of a candle. But then this vacuum, by not

vacuum seems to be derived from the Hebrew, קרן to *kindle, burn, melt, dissolve*, (*viz.*) the grains into atoms, and so make them more ready to give way, or make room for the spirit to come in, as if the place was empty. Horace calls the air a vacuum ; *expertus vacuum Dædalus æra*.—

Ode 3. l. 1. ver. 34.

being

being renewed by a fresh action of fire, or otherwise, to thin and divide the air, is gradually filled by the neighbouring parts of gross air coming in; and so the motion at length ceases. For the mechanism of the heavens is such, that it attempts to restore the balance or equilibrium of the air, wherever it is destroyed; and when the equilibrium is restored, motion can no longer continue. But this can never happen or be the case at the hinder part of the earth; so there will always be a draught of spirit, so an uniform accelerative force, and so motion. And this will be kept up and renewed by the columns of light and spirit, which the earth in its progression constantly turns behind: and so there will always be a force able to impel the earth, and overcome the resistance before. For as fast as the spirit attempts to restore the balance or equilibrium, by rushing into the light or rarefied air behind, the balance is destroyed by a fresh supply of fine æther or light being brought to it by the column of light turned behind the earth in its progression; and so this continual struggle to restore the equilibrium, preserves a continual impulse behind, and perpetuates the motion of the earth. And this vacuum will be in proportion to the size of the globe to be moved: for the larger and solider it is, the larger will be the column or pillar of light on the side next
the

the sun, and of spirit on the opposite side which it interrupts ; and the larger the pillar of light which is interrupted, the greater will be the vacuum which is made by that pillar of light so interrupted, and turned behind, as the globe is moved forward ; and the greater the vacuum, the greater and stronger will be the draught ; and the larger the pillar of spirit which is interrupted by the globe on the side opposite to the sun, the more gross air will be there ready and proper to rush in, and supply the draught.

The means therefore necessary to move a body in the firmament or airs, and to continue its motion, are a thinned space, or place full of light, or a vacuum, behind the body, for the spirit or gross air in motion to rush into and impel, and a constant renewal of the vacuum to continue the impulse, and so motion. And this is effected by the pillar of light, or air rarefied, and in agitation, being continually turned behind the earth ; which, as already observed, will make the impulse behind much stronger than the resistance before ; because the air before the earth is in its common condition, or mixture of light and spirit, and can easily be pushed away, and recede through the column or pillar of light intercepted by the hemisphere of the earth next the sun, and

so turn into the vacuum, or thinned air behind the earth, and heighten the action of the שוא, or *sucking in of the spirit* there.

I think the wind-gun will serve as a proof of the different effect of the air in its ordinary condition, when the light and spirit are mixed together, as they are before the earth; and when the air is mostly in grains or gross masses, or is condensed, as they call it, as is the state of that air which rushes into the vacuum, or thinned or rarefied æther behind the earth, and impels it on its western side. And it will also shew, how easily the resistance before is overcome by the impulse behind. Now, I must observe, that the condensation of the air, in the copper globe of Papin's wind-gun, is nothing more than filling it with such gross parts as cannot pervade or get out through the pores of the copper. For by thrusting into the globe a greater quantity of air than the globe could contain, did not some part escape through its pores, the grosser parts, by the reiterated act of letting in still fresh supplies of air, will press upon the smaller, and force such as can pass through the pores of the globe. And thus by thrusting in more and more into the copper globe, more and more small parts will be squeezed out through the pores; and the globe will be filled with larger and larger masses, or
mostly

mostly gross air. And a leaden bullet being properly placed, and the gross air in the globe discharged, it will expel the bullet through the barrel with great violence. Now, the gross air in the globe, which expels the bullet, is in a similar condition with the air behind the earth, which impels it; and which has been condensed, as one may call it, by the interposition of the body of the earth between it, and the flux of light from the sun; whereby the light is prevented from mixing with it; and the smaller parts in it may, perhaps, pervade the earth, which will make it still the grosser and more condensed. And the air before the bullet is confessedly in the same condition with the air before the earth; whose resistance, in the case before us of the wind-gun, is so easily overcome by the impulsive force of the gross air behind, as to seem as nothing.

I have often thought it a little surprising, that it should be supposed so strange a thing for such a fluid as the air to move the earth in the manner described; when we have so pat an example in the electrical experiment of a little glass globe being turned round its axis, and carried round a larger copper one by the electrical stream or effluvia, as they call this invisible mover. For what is this stream, but the air ground, and put into agitation, or the action of irradiation, light,

or *shemesh*, by the friction of the glass spheroid, and thence conveyed by the apparatus to the copper globe, from whence it irradiates against one half of the little glass globe, as the stream of light from the sun does against the hemisphere of the earth, which is opposed to it? And that this electrical stream is the agent which gives rotation and progressive motion to the little glass sphere, will not, I suppose, be denied. Nay, I think it admits of ocular demonstration, from the stream appearing in the dark like a faint bluish light illuminating one hemisphere of this little earth; and into whose edge, I suppose, the grosser particles of the air push, as I have described the spirit to do above in impelling the earth.

To recapitulate: The earth moves, or, more properly, is moved, between a column of light, or *shemesh*, whose base covers the enlightened hemisphere, having its vertex at the sun; and between a column of spirit, whose base also covers the darkened hemisphere, having its vertex towards the circumference of this system. And in whatever part of its orbit the earth is, it moves between two such columns acting upon it.

The progressive impulse of the See *Fig. 2.* spirit, by which the earth is carried forward, acts and impels in the line which divides the two columns

lumns of light and spirit, and is their common base, upon the sphere of the earth. The place of impulse is the western or evening edge, where it first began, (*Gen. i. 3.*); its direction is from west to east: and this impulse is what the Newtonians call *projection*, or *the projectile force*. The spirit descending in strait lines on every side from the circumference to the solar focus, urges the earth, in every part of its orbit, towards the sun as the centre; and this is what they call *gravity*, or *the centripetal force*. And between these two forces they own the earth may perform its circuit. And these two forces, by keeping it in an orbit round the sun, with its axis inclined to that luminary, and parallel to itself, continually shift the boundaries of the light and the spirit, and consequently the direction of the impulse of the spirit which lies between these boundaries, or in the plane of the circle of illumination. And as a line drawn from westward to eastward *, through the plane of the circle of illumination, (let the earth be in any part of its orbit), will be coincident with, or rather a segment or portion of the earth's orbit, or the ecliptic; and as the impulse of the spirit acts in that line; it fol-

* I say *westward* and *eastward*; because, strictly speaking, the direction of the spirit's impulse is exactly from west to east only at the equinoxes, and from thence it varies by degrees towards the south, and towards the north.

lows of course, that the earth must invariably be carried round in the ecliptic. And the light by this means (as Solomon describes it) *going towards the south, and turning round to the north, goes round in a circle: the spirit coming on, and in its rounds the spirit returns.*

Let us apply the demonstration, *Fig. 3.* by which they prove their imaginary powers of projection and attraction, to the real agents, *viz.* the pressure of the spirit on the back of the earth, and the lateral impulse on the evening or western side, as described above. “ If a body be
 “ moved according to the direction of any
 “ given right line *AZ*, (*Fig. 3.*), and at the
 “ same time be urged by a centripetal
 “ force tending towards a certain given
 “ immoveable point, as *S*, situated without
 “ the foresaid right line, so as to describe
 “ areas proportional to the times; the line
 “ described by the body will be a curve,
 “ and concave towards *S*, lying all of it
 “ in the same immoveable place, passing
 “ through the right line *AZ* and the point
 “ *S*; and if a body moves in this manner,
 “ it is urged by a centripetal force tending
 “ to the point *S* *.”

* Gregory's astron. l. 1. § 2. prop. 11. 12. Newton's Principia, l. 1. § 2. prop. 1. 2.

Now,

Now, suppose the earth by the lateral impulse to be pushed in the line AZ, and to have described by that impulse the space AB, and to be proceeding on, if nothing should hinder, to describe the space Bc equal to AB; but when it is arrived at the point B, let the spirit on the back of the earth be supposed to urge it in the line BS, or towards S; and with that force, that, if left to that impulse alone, it would be impelled through the right line BG, in the same time as by the other force alone it would have been impelled from B to c. Through C draw Cc parallel to GB, and through G, GC parallel to Bc; and it is manifest, that the earth from both impulses will describe the right line BC; because it is well known in mechanics, that a body impelled with two joint forces will describe the diagonal of a parallelogram in the same time as it would do the sides by the forces acting separate. By the same reasoning, the earth in the next portion of time will describe the line CD, and in the next DE. And if you suppose the number of triangles SAB, SBC, SCD, &c. to be encreased, and their size to be diminished, *in infinitum*; their bases AB, BC, CD, will constitute a curve line concave towards S, and lying in the same plane: and the centripetal force, which before acted by fits, and by equal intervals of time,

K 4

drawing

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drawing the earth from the tangent to that curve which the bases of the triangles measure, will now act constantly and without intermission. And the reverse of the proposition is also true, that as the earth moves in the bases of the triangles AB, BC, CD, DE; therefore it is acted upon by a centripetal impulse directed to the centre, and a lateral one pushing and impelling it at right angles to the centripetal impulse. Q. E. D.

An ingenious gentleman, to whom these sheets were shewn by a friend of mine, was so obliging as to favour me with the following objection, which I shall give in his own words, and then answer, as it is not improbable but the same may occur unto others.

“ The author proposes” (says he) “ to
“ account for the circular or elliptical mo-
“ tion of the earth round the sun, on the fol-
“ lowing principles, *viz.* Suppose
“ (*Fig. 4.*) S the sun, A the earth, *Fig. 4.*
“ AB that line in which the earth
“ would move on supposition of one force
“ only, namely, that of the lateral impulse
“ of the spirit in the direction VA, AS that
“ line in which the earth would move on
“ supposition of another force acting sepa-
“ rately, namely, the force or impulse of the
“ spirit in the direction RA. On supposi-
“ tion

“ tion of the two forces alone, the one
 “ acting in the direction RA, the other in
 “ the direction VA, the compound impulse
 “ would” (as the author says) “ carry the
 “ earth in a diagonal, or in the line AC;
 “ which motion continued, would describe
 “ a circular or elliptic curve.

“ But there is a third force which de-
 “ serves consideration, but is omitted,
 “ namely, the impulse of the light in the
 “ direction SA; which, if it be supposed
 “ greater than the force of the spirit acting
 “ in the opposite direction RA, would by
 “ degrees carry the earth off from the cen-
 “ tre S; if it be supposed less, would by
 “ degrees drive the earth upon the sun; if
 “ it be supposed equal, would leave only
 “ the force VA to act, the other contrary
 “ and equal forces destroying each other;
 “ by which means the earth would pro-
 “ ceed in a right line, (as AB for instance),
 “ as if no other force had acted on it.”

Thus far the candid monitor. And it must be confessed, that he has set the objection in the strongest light; for one or other of the cases must happen. But not even the last can effect the point in question: for the lateral impulse is not considered in its full force. Let the first case be supposed, namely, that the impulse of the light in the direction

direction SA is greater than the impulse of the spirit acting in the opposite direction RA; I say, that the lateral impulse in the direction VA being equal to, or greater than that of the light in the direction SA, will prevent the earth from being carried off from the centre, and make it describe a curve, concave towards the centre. For as the impulse of the light in the direction SA,

(Fig. 5.), by supposition, exceeds
 Fig. 5. the contrary impulse of the spirit RA, the impulse of the spirit need not be considered, but only the excess of the force of the light above that of the spirit. Let the impulse then from S to A be impelling the earth in the direction SA, at the same time as the propulsive and progressive impulse with an equal or a greater force is propelling it in the line SB; it will thereby move neither in the line SA, nor SB, but in the diagonal SC, (Fig. 5.). And if the two powers or impulses be equal to each other, the line SC shall pass in the middle between SA and SB, dividing the angle under ASB into two equal parts; but if the impulse in the direction SA be greater than the other, then the line SC shall incline most to SA. See Newton's *Principia*, l. 1. p. 14. and Pemberton's *Review*, p. 30. In like manner, if, in the second case, the impulse of the light be supposed less than
 that

that of the spirit ; yet this prevalency of the spirit's force will not, as inferred, drive the earth upon the sun. For the same reason will hold as in the former case, namely, that when a body is acted upon by two forces at the same time, it will not move in the direction of either of the forces, but in the diagonal, or line between them. And as the earth is impelled or acted upon at the same time by the centripetal force of the spirit on its back, and the propulsive impulse on its western side, it will therefore neither be driven upon the sun, nor from the sun, but move in a line between the direction of the two forces, that is, round that luminary. Now, it must be observed, that this second case is the parallel to the Newtonian account of the earth's motion round the sun, upon whose principles I was shewing, that the earth would also move round it by the two impulses of the spirit at the evening-edge, and at its back. The Newtonians suppose, that if the power of gravity was suspended, the earth, by its projectile force, would fly off in a tangent to its annual orbit ; and if the projectile force was suspended, that gravity would drive it upon the sun ; but that these two forces acting as above, carry it round the sun in a curve line. Now, the Newtonian gravity tending towards the sun as its centre, is exactly the same as the pressure of the spirit
on

on the hinder part of the earth, or the dark hemisphere, which tends towards the sun the centre: and as the pressure is here supposed to exceed the contrary pressure of the light from the sun, subtract the contrary pressure of the light, and the remainder or excess may be considered as the gravity of the earth towards the sun, which will increase in proportion as the distance from the sun decreases; and if the lateral pressure was to cease, this back pressure would carry the earth to the sun; and if the back pressure was to cease, the lateral impulse would drive off the earth in a strait line or tangent. Now, if the Newtonian gravity, which continually attracts the earth to the sun, can draw the earth from a rectilinear course into a curve one, and so exactly counteract the projectile force, as to retain it in its orbit, without any supposed danger of driving the earth by degrees upon the sun; then, by parity of reason, the lateral impulse of the spirit in the direction AB, BC, &c. (see *Fig. 3.*), and the back pressure or impulse in the direction BS, CS, &c. will carry the earth round the sun S, without any danger of its being driven upon the sun by the excess of the force of the spirit on the back of the earth, above that of the light on the opposite hemisphere. For the objection affects the Newtonian account as much, and in the same manner, as it does mine; and if the
excess

excess of the force of the spirit on the back of the earth will drive the earth upon the sun, it must be driven thither by the force of gravity. And if the scheme above is to be a demonstration, that the projectile force and gravity are sufficient to carry the earth round the sun; then it will also be a proof, that the lateral force of the spirit, with that on the back or dark hemisphere of the earth, will carry the globe round that luminary, notwithstanding the force of the spirit on the back is superior to that of the light on the fore part of the earth; which was the thing I brought this proposition of Sir Isaac's to prove, as *argumentum ad hominem*. And if this author's first corollary from the laws of motion is true, that when a body is acted upon by two forces at the same time, it will describe the diagonal, by the motion resulting from their composition; and if the forces are equal, the line shall pass in the middle, dividing the angle into two equal parts; but if the one force is greater than the other, the line shall incline to that side in the direction of which the greater force acts: I say, if this corollary is true, my application of the proposition will hold good. For suppose, as in the case above, that the force of the spirit is greater than that of the light, the force of the light need not be considered, but only the force of the spirit acting with that degree of strength by which it exceeds

exceeds that of the light, and therefore was omitted; and the force of the spirit was considered alone. Which as it exceeds that of the light, in the contrary direction, the excess of the force of the spirit above that of the light may be taken alone; and so this force of the spirit pressing the earth to the sun may be put for gravity, and the lateral impulse of the spirit for the projectile force; and then the proposition will prove, that these two forces of the spirit will carry the earth in an orbit round the sun as its centre. Which was the thing to be demonstrated.

I come next to the third and last supposition, of the two contrary forces of the light and spirit being equal; which I think indeed, *cæteris paribus*, is nearly the case. But, nevertheless, the inference which the objector draws from the equality of the two forces of the light and spirit, namely, that the earth will be moved in a strait line, is wrong. For though the two forces, being contrary to, destroy each other, so as neither can prevail against the other; yet the earth will not therefore proceed in a right line, as if no other force acted upon it, as is supposed, but in a curve, having the sun for its centre. For they both act upon the globe, and thereby prevent it either from approaching nearer to, or from receding further from the sun; and as these two forces tend to and from a centre,

centre, which is the sun ; a force applied in a lateral direction, will make it describe a circle round the sun, as the centre, just as a lateral impulse applied to a body suspended by a string, will make it describe a curve, having the point from which it is suspended for its centre. And this case may be compared to a pendulum, or weight suspended by an inflexible rod hung on a pin as its centre of motion. Its weight, or gravity, will hinder it from approaching any nearer to the centre, and the rod will prevent its weight or gravity from carrying it further from the centre : but, nevertheless, it is capable of being put in motion by a lateral impulse, and will describe, not a strait line, but arcs of a circle, whose centre is the pin from whence it is suspended. And as the two forces are supposed equal, the case of the earth will be exactly analogous to that of a pendulum. I must also remark, that the objector supposes the lateral impulse to impel continually in the same direction, as AB, for instance, (*Fig. 6.*) ; where- *Fig. 6.* as if the reader will turn back to the place where I treat expressly of the earth's motion, he will find, that the direction of the impulse is continually changed, as the earth proceeds in her progressive motion, from the direction AB, to that of BC, CD, DE, EF, FG ; the progressive impulse being always exerted in the direction of the plane

plane of the earth's enlightened hemisphere, which plane is always perpendicular to rays drawn from the centre of the sun to that plane ; as in the figure. Indeed, in this case, one would be ready to judge that there could be no rotation of the earth round its axis ; because, in order to this, it is required, that one edge of its hemisphere be turned towards the sun, and the other from it ; which the equality of the two counter-forces of the light and spirit would prevent. But it must be remembered, that the greatest force of the light is at the middle of the cap, upon the meridian of the earth, where the solar rays strike in a perpendicular direction ; and that its force decreases from thence to each side, in proportion as the rays diverge : so that the resistance will be least at the evening and morning edge of the enlightened hemisphere, and strongest at the middle or meridian of that hemisphere or cap of light ; and consequently the earth will have liberty to revolve, and the impulse of the spirit an opportunity successively to turn one edge to the sun, and the other from that luminary ; and the earth will revolve or turn upon the point of the column of light from the sun that strikes its meridian, or which lies in the middle of the hemisphere of light.

As

As the cause of the motion of the earth, or the real agents which carry it round the sun, though revealed in the scriptures, are but very lately recovered ; the reader must not expect, at least from me, a nice calculation of the forces with which the light and spirit act. It is the province of the *mathematician*, to investigate the force with which a body can be retained in any given orbit, with a given velocity ; and accurately to adjust this intricate point : and I pretend not to the honour of that *name*. It will be enough for me to give a rough draught, and leave the niceties to others. Neither can he receive much information from the calculations of our Newtonian mathematicians ; which, though exactly enough fitted to their imaginary powers, must be cautiously applied to the real ; and cannot, I think, be safely depended upon. For though their proportions of the increase and decrease of gravity, according to the planets approach or recede from the sun, seem to bear some analogy to the pressure of the spirit upon the back of the moving orbs, which increases as the distances from the sun decreases ; yet their *centrifugal force*, and *projection*, are terms more vague, and not so analogous to the real cause of motion. They see a stone thrown up into the air return to the earth again, describing in its descent a conic section.

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Its

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Its descent to the earth (say they) is owing to its gravity, and its ascent to its projection; and the projectile, if gravity and the resistance of the air were taken away, would not be bent to the earth, but would go away in a strait line, and this with an uniform motion. And they reason thus. If a cannon-ball projected by the force of gun-powder, with a given velocity, in an horizontal line, from the top of any mountain, would proceed in a curve line, to the distance of two miles before it fell to the earth; then, with a double velocity, it would go twice as far; and with a tenfold velocity, ten times as far, if the resistance of the air was taken away. And by increasing the velocity, the distance to which it would be projected, might be increased at will, and the curvature of the line it would describe be diminished; so that at length it should fall at the distance of ten, thirty, or ninety degrees; nay, that it should go round the whole globe of the earth, or should fly off into the heavenly spaces, and go on for ever. And by the same reason, that a projectile, by the power of gravity, shall be bent into an orbit, and go round the earth; the moon may continually be drawn from a rectilinear course towards the earth, and go round it, and the earth go round the sun.—But this is an odd way of reasoning from appearances, when we have nothing that appears similar
to

to this in the motion of heavy bodies at the earth's surface ; for these, in whatever direction they are projected upwards, perpendicularly, or obliquely, are always made to fall to the earth by their gravity : and it is hard to conceive how a planet, after approaching to the sun, can recede from it again ; especially since its gravity is increased as its distance decreases. And if we judge from appearances, it ought rather, one would think, to continue to approach to the sun, and at length fall upon his body, as heavy bodies fall to the earth. But to remedy this, they have found out other laws of gravity, which make bodies approach to the centre, and suffer them to recede from it by turns.

—“ A body at A” (say they,
Fig. 7.) “ projected with a cer- *Fig. 7.*
 “ tain force in the line AE, per-
 “ pendicular to AS, the point S being the
 “ centre of attraction, will describe with an
 “ equable motion the circle ALa; when
 “ it has compleated its revolution, and re-
 “ turned to its first place A, it has (as sup-
 “ posed) the same velocity as at first setting
 “ out; and the same gravity that acted up-
 “ on it at A, and carried it below the tan-
 “ gent AE, acts upon it at any other point
 “ L, at an equal distance from the centre
 “ S, and brings it from the tangent at L,
 “ through an equal arc in the same time.
 “ The centrifugal force arising from its ro-
 L 2 “ tation,

" tation, being equal to its gravity, the bo-
 " dy keeps at an equal distance from the
 " centre S, and describes a circle. If the
 " projection be increased, the gravity must
 " also be increased. *Ex. gr.* If the velo-
 " city of the projection be double, the gra-
 " vity requisite to keep a body in the same
 " circle must be quadruple; because the arc
 " AK being double of the arc AL, the
 " point K falls four times farther below the
 " tangent than the point L, the line *mK*
 " being four times *ML*. So that, in gene-
 " ral, the gravity necessary to retain a body
 " in the same circle, is in the duplicate
 " proportion of the motion of projection;
 " and the velocity therefore in the subdupli-
 " cate proportion of the gravity; so that
 " when the gravities are as 1 to 4, the ve-
 " locities are as 1 to 2.

" If the body is projected at D with the
 " same velocity, the gravity must be grea-
 " ter to retain it in this lesser circle; because
 " the curvature being greater, the extremi-
 " ty P of the arc DP, equal to AL, falls
 " farther below the tangent at D than L
 " falls below the tangent at A, in propor-
 " tion as the arc DP is more curve than AL;
 " that is, in the ratio of the distance SD to
 " SA. If you increase the velocity of pro-
 " jection at D, so as to make the body de-
 " scribe a greater arc DQ in the same time;
 " then

“ then the force of gravity necessary to re-
 “ tain the body in the circle, must be in-
 “ creased in a duplicate proportion; be-
 “ cause QT is to PR in the duplicate
 “ proportion of DQ to DP . Let the velo-
 “ city at D , for instance, be greater than
 “ that at A in the ratio of SA to SD , then
 “ QT will be to PR as the square of SA to
 “ the square of SD ; that is, the force re-
 “ quisite to retain bodies in circles, must be
 “ reciprocally as the cubes of the semidia-
 “ meters, when the velocities in these circles
 “ are reciprocally as the semidiameters them-
 “ selves; and *conversely*, if the gravities in-
 “ crease as the cubes of the distances from
 “ the centre decrease, the velocities neces-
 “ sary to carry bodies in circles, at different
 “ distances from the centre of attraction,
 “ must increase in proportion as the distan-
 “ ces decrease. In general, as the gravities
 “ of bodies that describe circles about the
 “ same centre, increase in proportion as the
 “ squares of the velocities increase, and as
 “ the distances decrease; it follows con-
 “ versely, that in order to compare the ve-
 “ locities of projection that are requisite to
 “ carry bodies in circles at these different
 “ distances, we must compound the pro-
 “ portion of the gravities, and the propor-
 “ tion of these distances together; for this
 “ compounded proportion will give that of

“ the squares of the requisite velocities. So
 “ in the solar system, if the distances of two
 “ planets were as 1 to 4, the gravities being
 “ as 16 to 1; these proportions compound-
 “ ed, give that of 16 to 4, or of 4 to 1,
 “ which is that of the squares of the velo-
 “ cities; and therefore the velocities them-
 “ selves are as 2 to 1.

“ If a body is projected at
 Fig. 8. “ A, (Fig. 8.), with a velocity
 “ less than that which is necessary
 “ to carry it in a circle there, it must fall
 “ within the circle; the centrifugal force *
 “ arising from the motion of rotation about
 “ S, is less than that which it would have in
 “ the outmost circle ALA, in proportion as
 “ the square of its velocity is less, and is
 “ therefore less than its gravity in the same
 “ proportion: the body therefore, by the
 “ excess of its gravity above its centrifugal
 “ force, is made to approach to the centre.

“ If a body is projected at B, in a di-
 “ rection perpendicular to SB, with a ve-

* The centrifugal force is, in reality, the lateral impulse of the spirit that impels the earth on the evening-edge; which, as it acts in a perpendicular direction to the force of the spirit on the back or dark hemisphere of the earth, or the *centripetal* force, as it is called, endeavours to make it fly off from the centre, in a tangent to its orbit. This centrifugal force and projection are here supposed equal; and I think are taken by the Newtonians for two distinct forces, though they are one and the same.

“ locity

“ locity greater than that which is necessary
 “ to carry it in the inmost circle BGH, about
 “ the centre of attraction, at the distance
 “ SB; it must be carried without that circle,
 “ and recede from the centre S. The
 “ centrifugal force in this case is greater than
 “ it would be from its motion in the circle
 “ BGH, and therefore greater than its gra-
 “ vity; and by the excess of its centrifugal
 “ force above its gravity, it recedes from the
 “ centre S, in the same manner as it acceded
 “ to it in the former part of its orbit: and
 “ therefore it is made to move in its ascent
 “ from B to A, in a semiellipse equal and
 “ similarly situated to that which it de-
 “ scribed in its descent from A to B. At
 “ A, the higher apsis, the gravity prevails
 “ over the centrifugal, and makes the body
 “ approach to S; at B, the lower apsis, the
 “ centrifugal force prevails over the gravity,
 “ and makes the body recede from it; and
 “ by their actions, the body for ever revolves
 “ from the one to the other.”

Our philosophers likewise observe, that
 when the motion of a projectile becomes
 parallel to the horizon, the projectile no
 longer ascends, but forthwith directs its
 course downwards, descending in a line alto-
 gether like that wherein it had before as-
 cended; and that a pendulum, all the Time
 it approaches towards being perpendicular to

the horizon, it more and more descends ; but as soon as it is come into that perpendicular situation, it immediately rises again by the same degrees as it descended before. So here, the body more and more approaches the centre all the time it is moving from A to B, but thenceforward it rises from the centre again by the same degrees as it approached before.

By such laws as these they shew, that it is possible for a body to be acted upon by a force continually drawing it down towards a centre, and yet that the body shall continue to recede from that centre. But then they proceed, and build upon mere suppositions, such as these, that a body once put into motion, will continue to move right forwards perpetually, after the power which gave the motion is removed ; and also will preserve the same degree of velocity as was first communicated ; except as it is retarded by the air, and bent downward by gravity : and that the planets move in a space empty of all sensible matter. It is likewise supposed, that gravity and the centrifugal force decrease and increase in such and such proportions as best serve their turn. At A, (*Fig. 7.*), where the gravity should be least, it is supposed to be greater than the centrifugal force ; at B, where it is the greatest, it is to be less than the centrifugal force. And in order to make this

this out, the centrifugal force is to increase in an higher proportion than gravity increases, *viz.* as the cubes of the distances decrease; whereas gravity increases only as the squares of the distances decrease. And then the velocities of the moving bodies are supposed to be in such and such degrees as they please; and so (as Baruch says of the Chaldean idols) can be nothing else than the workman will have them to be. Here then is a curious string of mathematical suppositions, which will not do their business, neither have they any foundation in nature. “ For, *first*, It is supposed, that a certain
 “ degree of motion or velocity was com-
 “ municated to each of the planets at the
 “ creation, (I presume), which has conti-
 “ nued ever since; and that this motion is in
 “ some parts of their orbits retarded, by the
 “ action of gravitation being contrary to it
 “ in their recess from the sun; and at other
 “ Times accelerated, by gravitation tending
 “ the same way, or coinciding with it, in
 “ their approach towards the sun.

“ Now supposing (but not admitting to
 “ be true) that by these contrary actions a
 “ planet from the perihelion to the aphe-
 “ lion run one half of its orbit; yet it can
 “ never, by the same *cause* alone, move a
 “ second time in the same orbit; but must
 “ continually, from the time it passes the
 “ aphelion,

“ aphelion, approach nearer and nearer to
 “ the sun, till at last they unite. For since,
 “ by supposition, the motion of the planet
 “ is only accelerated by gravitation; what-
 “ ever degree of velocity it acquires from
 “ this *cause alone*, the direction of that mo-
 “ tion being to the sun, the planet must al-
 “ ways at the same time be compelled nearer
 “ and nearer to the sun;” (and they have
 provided no iron rod to reach from the sun
 to the planet, as in the case of a pendulum,
 to keep it at its proper distance, and prevent
 its too near approaches); “ and the nearer it
 “ comes to the sun, a much greater force is
 “ requisite to divert it from that direction,
 “ no other cause being assigned to alter the
 “ direction or tendency which it acquires by
 “ gravitation towards the sun. The increase
 “ of velocity alone can never alter the di-
 “ rection, no more than the increase of the
 “ velocity of a stone falling to the ground,
 “ alters the direction which it received, when
 “ it was first suffered to fall from any height,
 “ where its motion was the slowest*.” And,
 2dly, Bodies do not move of themselves after
 the force that put them into motion is with-
 drawn; but it is the air which gives and
 continues them in motion: neither is the
 resistance of the air before, strictly speaking,

* See Colden's *principles of action in matter*, p. 72.

the cause of their stopping or ceasing to move ; but the cessation of the impulse behind. *3dly*, The planets do not move in a space empty of all sensible matter, but in and by the fulness, stress, and compressure of the firmament. And, *lastly*, They are not projected with a given velocity in an infinite void, and left solely to the direction of gravity, to keep them in order ; a power which they yet know not whether to place within or without the body to which they tend : but they are moved by an equable and continued impulse of the circumambient æther put into friction and agitation on their western sides, where there is a much greater heat than at the other side, and where, consequently, the spirit or grosser parts of the aerial fluid will be continually pushing in ; and they are made to incline towards the sun by the reflux of the aerial fluid returning to that luminary to maintain the action there ; and towards which there must, by these means, be a prevailing pressure. And by the joint action of these agents the earth and planets are moved in their orbits round the sun, the centre of their motion. In short, the real agents act in the following manner. The impulsive force of the spirit, which carries the earth forward, or gives it progressive motion, impels in a tangent to the earth's annual orbit, in whatever part of that orbit the earth then is, and on the western or evening

evening side of the globe. The pressure of the spirit at the back of the earth acts in a direction almost, if not altogether perpendicular to the lateral impulse: the lateral impulse is stronger than the pressure towards the sun, because there is a continued friction and action of the light and spirit kept up and sustained there, whereby the impulsive impetus is preserved in its wonted strength and vigour; and what is spent, is continually, by this action, restored: whereas the reflux of the spirit from the circumference to the sun, the centre, which acts upon the back of the earth, is a kind of gradual pressure, a *נטיה*, *tendency, inclination, or gravity*, (as they call it), towards that luminary; and differs much from the action on the evening-edge of the globe, where the impulsive force of the spirit exerts itself. The velocity of the spirit increases, as the distance from the sun decreases; and the velocity of the light decreases, as the distance from the sun increases, in a reciprocal proportion. For if lines were supposed to be drawn from the centre of the sun to the circumference of the heavens, the force and velocity of the light will decrease from the sun to the circumference, in proportion as the lines diverge; and the force and velocity of the spirit in its course from the circumference to the sun, the centre, will increase as the lines converge. And the alternate and contrary motions

motions of the light and spirit from and to the sun, may be compared to the manner in which water would move in two erect tubes united at their small ends, each of whose widths should increase from little more than a point, as a degree of the heavens widens from the sun to the circumference: for if it was possible to press the water in one of these tubes with quicksilver, or something instead of a pistil, so as to fit it at each width; in proportion as the quicksilver or &c. should be pressed down in one tube or line, the water being most pressed in that would sink, and being less pressed in the other would rise up, or rise the contrary way; and every atom of water would be employed to push on another: and in proportion as the water would move in each part of each of the tubes, so the spirit and light move, with the same degrees of velocity, in each part of the semidiameter of the heavens. And as the spirit and light were in the immediate hands of their great creator and former, (*I form light and create darkness, saith the Lord, Is. xlv. 7.*), we have every reason to presume, that his infinite wisdom and foreknowledge would adjust and proportion the force of each of them, so as best to answer the ends for which he created and formed them. He would place the globe of the earth and the planets at such a proper distance from the sun, the centre of their motion,

tion, as that the pressure of the spirit on their backs should constantly incline and keep them in their orbits round that luminary; and would make that pressure of that just force, as to be sufficiently strong to bend them from a rectilinear course, and yet not so strong as to bend them too much, and so drive them into the sun. And he would proportion the action and friction of the light and spirit at the evening or western edge of the earth, and the other moving orbs, so as to be of a force sufficient to overcome the resistance before, or at the morning-side; and to retain them at their stated distances from the sun, without suffering that action to be so great, as to carry them off in a right line or tangent.

If in any part of the earth's annual orbit the pressure of the spirit behind be greater than ordinary, or, which is the same thing, if the counter-pressure of the light be less, the earth will in either case be made to approach, in that part of its orbit, nearer to the sun: or if the lateral impulse, in any part of its orbit, be stronger or weaker than ordinary, the earth will be impelled further off, or brought nearer to the sun. And as the moon and planets are sometimes so situated or interposed, as, either by the intervention of their bodies, or their fluxes of light reflected to the earth, to interrupt the
action

action of the spirit or of the light in that column of each, which, in their flux and reflux from and to the sun, hits the earth; this may lessen or abate the pressure of either column, and so bring this globe in one part of its orbit nearer to the sun than in the other. And by this means the action of the light from the sun upon the earth may be increased or diminished, and the earth thereby be made to move faster or slower: and by this means, or by its being nearer to the sun in one part of its orbit than the other, (in which case its orbit will be an ellipse, having the sun in one of its focuses; though the orbit of the earth, and the orbits of the planets, differ very little from circles by all accounts); I say, by this means, the earth will take up more time in going from the vernal to the autumnal equinox, than from the autumnal to the vernal equinox; and so the summer be about eight days longer than the winter, as our astronomers make it. To the interruption of the columns of light or spirit from each other, are owing, as I think, the disturbances which Jupiter and Saturn suffer from each other when in conjunction: for the free motions of the ether will be most obstructed in the space between, and cannot push so strongly against these bodies on their sides that are nearest to each other, as on their outer sides: and, consequently, the pressure

pressure of the ether on their outer sides will endeavour to push them together with that force with which the pressure of the circumjacent ether, which lies on their outer side, exceeds the pressure of the ether between the two planets; and this pressure will be in proportion to the distance the bodies are from each other. When bodies are near, they will be driven together, and cohere: and this is the Newtonian attraction of cohesion. When they are at a greater distance, they only *gravitate to each other*, as the Newtonians call it. Here then will be a large field for the mathematician to expatiate in, and to exercise his talents in calculations of the different forces of these streams of light and spirit; which may possibly open the way to yet undiscovered truths, and clear up the *minutiæ* which are sometimes neglected in our calculations.

I shall just observe, that the fluxes of light from the planets upon the earth, are in the Hebrew called *מולות*, *influencers*, or *regulators*. Now, men, when they began to lose the knowledge of the mechanism of the heavens, and to set them up as gods, might imagine, that they had an influence upon their lives and fortunes, &c.; whence judicial astrology might take its rise. And if the astrological configurations of the planets, the placing them in houses, and the calculations

tions of their different positions, aspects, and so forth, be of sufficient antiquity; this might originally be designed, not to calculate nativities, but to measure the force and action of the light and spirit, and how much, and in what manner their agency was diminished, increased, or altered by these different positions.

Mr. H. is of opinion, that there is an accident within the earth, that has a main hand in its rotation; and this is the inner globe: which was formed by what the waters tore away off the surface of the earth, and carried with them, both at the first formation, and also at the reformation of the earth after the deluge, into the central hollow or abyss, where it swims or floats like a nucleus or kernel in the waters.

(See *Fig. 9.*). Now, if this globe *Fig. 9.* shifts its place, as the earth goes forward, and thereby alters the centre of gravity (as it is called) of the whole sphere of the earth, this, I think, may contribute to its rotation or rolling round. If it be said, that the earth turned round upon its axis before the inner globe was formed; I own it did: but then both it, and the agents which now move it, were in the immediate hands of their Creator, in which they remained until such time as the inner globe was formed, and God rested from his work, and com-

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mitted

mitted it to the rule of his material delegates. And as the activity of the solar light, doubtless, penetrates into the abyfs, it will agitate and rarefy the water and air in it between the shell or crust of the earth, and the inner globe, on the side next the sun; and the air and water on the opposite side being less agitated, will be more gross; and will therefore endeavour to push into the thinner part, and so drive the globe forward into the rarefied hemisphere of waters: and as the whole waters of the abyfs are constantly thus alternately agitated and rarefied, this may give motion to, and continue this inner globe in motion. And perhaps this may be the cause of the nutation or oscillation of the axis of the earth, of which astronomers take notice, and which makes the equinoctial points to move backward, and the axis of the earth in every annual revolution twice to change its inclination to the ecliptic, and twice to return to its former inclination. For as, at each solstice, the solar light over-reaches each pole; its agency, as described above, may occasion the inner globe, which is then objected to the heat and activity of the solar rays, to approach a little nearer to the pole; and this may cause that extremely small deviation from perfect parallelism which causes the precession of the equinoxes. And what seems to favour this hypothesis, is, the axis
of

of the earth being restored to its former state at the equinoxes, when the action of the solar heat being from pole to pole, the inner globe may be supposed to be at an equal distance from each pole. If I am asked, What I take to be the cause that the earth's axis twice every month, as well as twice every year, changes its inclination to the plane of the annual orbit, or, in other words, varies in a small degree from perfect parallelism? I answer, That with Sir Isaac Newton I think, and I rejoice that my sentiments coincide with what that great philosopher has delivered, that the moon is the cause of this variation, from the influence or effect her body and light may have upon the equatorial parts of the earth, or the equatorial annulus, as the Newtonians chuse to call it, by interrupting the columns of spirit or of light in their passage to that part of the equatorial ring, where the moon passes her syzygies, and thereby throwing a greater pressure upon the other parts. When the moon is in her quarters, the pressure of the spirit will be equal upon the ring; but as she approaches either of her syzygies, the pressure will become unequal; and the greatest inequality will be always at the time of her syzygies, as the equilibrium will again be pretty nearly restored at her ensuing quarters.—But these I throw out only as conjectures, or hints, which others may

happily improve ; and hope for pardon, if I am mistaken ; since the mistakes of one person have sometimes paved the way for another to come at the truth.

I may have fallen short in my explication of the manner how the agents act and perform their office : but I think it will evidently appear to an unbiaſſed reader, that the ſcriptures make the *ſhemesh*, or the ſolar light, and the ſpirit, the agents that move the earth ; and that there is a perfect harmony in their accounts. The Royal Pſalmiſt deſcribes the *ſhemesh* as having a tabernacle fixed in the heavens, from whence, as from one extremity, *viz.* the centre, he goes out in light, and returns in ſpirit from the other extremity, the circumference, or verge of this ſyſtem. The *ſhemesh*, and his *tabernacle*, are ſpoken of here as two diſtinct things ; the one is ſaid to be fixed in the heavens, the other to iſſue from this fixed point, and to run its appointed race. The *ſhemesh* therefore cannot, in this place, be the orb of the ſun, nor the orb of the ſun be ſaid to move. In like manner, in Solomon's deſcription, the *ſhemesh* is ſaid to ſpring up or out (זרה) upon the earth, and to go in to draw or ſuck in the ſpirit at מקומו, its ſtation ; namely, at the equator, where the light has a continued ſtation ; to ſpring up thence, or give way to what is sucked

sucked in, viz. to the spirit; to go towards the south, and turn round to the north, making or circuiting a circuit, the spirit continually going on, pursuing the light; and upon its circuits the spirit returns, viz. to the same place whence the solar light first sprang out. Here מקומו is, as I take it, the autumnal equinox, because the solar light is said to go from thence to the south; which it really does. And from hence there is great probability to conclude, that the earth began its motion from the opposite point of the equator, with the sun in Libra. So here is an exact description of a tropical year. So Job ix. 6. *Who shaketh (or skook) the earth out of her place, (מקומה, the same word as above), and the pillars thereof tremble.* This too, perhaps, may refer to the giving progressive motion to the earth, at first, at the equatorial point, as above. However that may be, it has, by some commentators, been looked upon as a stronger proof of the local motion of the earth, than any of the others usually produced for its rest: and so in truth it is; especially if we take in the next verse, *He commandeth the sun, and it riseth not; and sealeth up the stars.* This is an express declaration, that the sun is at rest, and moves not; and cannot be spoken *ad captum vulgi*, or according to the appearances of things; because to appearance the sun both rises and sets. And if the other

texts speak of the orb or body of the sun, then the scriptures affirm, that the sun rises, and does not rise; or moves, and yet is at rest. For in this text the sun is said not to rise, and that God has so ordained that it should not rise. And *Eccles.* i. 5. and in many other places, we read of the sun rising and setting. Now, as in the original there are two different words used, both of which are rendered *sun*, we must conclude, that in the text of *Job* above, where it is so positively asserted that the sun does not rise, that the body or orb of the sun, or solar fire, is there spoken of; and in the other texts, where it is as positively asserted that the sun rises and sets, that the solar light, or flux from the body or orb of the sun, is meant. **הָרָם**, *HeReS*, is the word in *Job*; and **שָׁמַשׁ** in *Ecclesiastes*, and other texts. The first is the solar fire, or orb wherein the fire acts; the other the solar light, which flows from, or more properly is pushed out every way in rays from the focus by the influx of the spirit. So in *Job*, it is the solar fire or orb which God has ordered not to **זָרַח**, to spring up or out, as the **שָׁמַשׁ**, the solar light, is described to do by the same verb **זָרַח** by Solomon*.

I know

* **הָרָם**, which perhaps may be a compound of **הָרַח**, to beat; and **רָם** *fregit, contrivit*, to tear or break in pieces, is used,

I know there are some writers so ingenious as to suppose this text to refer to the miracle of the *sun standing still at the voice of Joshua*. But surely the language of the scriptures must be extremely vague, if the *sun standing still* after it was risen, may be properly expressed by its *not rising*; and if what one author says, of *God commanding the sun, and it riseth not*, can possibly be a

used, *Deut. xxviii. 27.* for a burning ulcer, or some such thing; whence it should, I think, mean the body or focus where the fire acts. But I must acquaint the reader, that there are two texts produced where the sun under this word is said to *rise* and *set*. And if therefore it means, as we say, the orb of the sun, then the scriptures assert the motion of the sun. The texts are *Judges viii. 12.* and *xiv. 18.* The original of the first is **מלמעלה החרם** translated, *before the sun was up*; but **מלמעלה** is an adverb: and the text implies nothing more than that the solar fire or orb was *above*, or *over-head*, as we say, without determining whether it moves, or is at rest. The interlineary version of Pagninus has, — *desuper Sole, i. e. existente*; and an old English Bible, *the sun being yet hie*. Our translators render **מלמעלה** *before*, and insert after **חרם**, the words *was up*, to make out what they thought the sense of the passage. But the literal translation, as well as plain meaning of the passage, is, that *Gideon returned from battle, the solar fire being on high*. In the second passage, the original runs thus, **יבא החרם** **כטרם**; which is rendered, *before the sun went down*. But the final **ה**, by their own rules of grammar, opposes the noun **החרם** being the nominative case to the verb **יבא**; so it must be taken and rendered impersonally; as in the Hebrew phrases, *It turns evening, It turns morning*; or in our English ones, *It rains, It is night, It is day, &c*; and it will literally be, *before it went towards the sunward*. The last day of the feast was almost expired; and before it went towards the solar orb or fire, they explained the riddle.

reference to, or intended to relate a miracle recorded by another, of *the sun standing still at the voice of a man.*

The original words in *Joshua* are, **רום שמש**, *Sbemesb, stand still, or be silent*, as in the margin; and **ויעמר השמש**, *the sbemesb staid*; in *Job* it is, **חרם לא יורה**, *the HeReS riseth not*: words as different as the things they are designed to express. So that we may fairly conclude, that *Job* is not here referring to any miracle, (that to which this is supposed to refer being, as is most probable, much later than his time); but that he is celebrating the wisdom of the Creator in the works of creation and formation, and the œconomy of nature; among which he justly reckons the motion of the earth caused by the vibration of the airs; the constituting the solar focus and fire in it, so that the fire should not spring up or out, as the solar light does, but remain in its place, and act only where it is present, in its proper focus; and sealing or fixing the stars, so that the operation of the skies, which moves the earth and planets, should not move them.

Job, in the text above, makes mention of the pillars of the earth; as does Hannah in her prayer, 1 *Sam.* ii. 8. and says, that the Lord has set this globe upon them: and,

Job

Job xxvi. 11: we read of the pillars of heaven. With which expressions some of our great men have made themselves merry, not knowing the scriptures, nor the power of God. For they are the matter of the heavens in continual flux and reflux from and to the sun, the centre, which embrace and support the earth; so are called by Hannah מצקי, the *compressors*, from צוק, to *compress*; and by Job עמרי, the *supporters*, from עמר, to *sustain* or *support*: and Job says, they tremble as the earth moves; that is, as I suppose, they have some such tremulous motion as the water has which is pushed away by a boat, or a ship under sail. If the heaven or airs be supposed to be divided from the centre to the circumference into columns, these may be termed the pillars of heaven; and those which rest upon this globe, compressing and supporting it, are the pillars of the earth.

That the earth does not move in empty space, or hang upon nothing, but on the בלימה, the mixture of the spirit and light, is expressly asserted by the inspired writers; and was the general opinion till very lately. Hippocrates says, that air is the vehicle of the earth*. And of this aerial support, or pillars,

* *Lib. de flatibus.* His words are these: Καὶ τὰ μὲν ἐπὶ τῆς [αἰρος] το βαθρον, οὗτος [αἰρ] γὰρ τῆς γῆς οὐχίμα. So Ovid says,

pillars, I shall produce a very remarkable Heathen testimony, which I do not find Mr. H. or any other has cited. It is in *Phurnatus of the nature of the gods*, under *Atlas*:

Τῆτον δ' ἄλλως εἶναι καὶ Ἀτλάντα, καὶ ἀταλαιπορῶς ἀποδιδόντα, τὰ κατὰ τοὺς ἐμπεριεχομένους ἐν αὐτῷ λόγους γιγόμενα, καὶ ὅτω τὸν θρανὸν βατ' αἴζοντα· ἔχειν δὲ χίονας μακράς, τὰς τῶν στοιχείων δυνάμεις· καθ' ας τὰ μὲν ἀνωφερῆ ἐστὶ, τὰ δὲ κατωφερῆ· ὑπὸ τούτων γὰρ διακρατεῖσθαι τὴν γῆν. p. 202. edit. Gale. i. e.

“ Him they call *Atlas*, because, without
 “ any fatigue, he performs all the things
 “ that are said of him ; and in this man-
 “ ner he bears up the heavens, namely, by
 “ long pillars, which are the powers of the
 “ elements, by which some things are carried
 “ upwards, some downwards ; and by these
 “ pillars is the earth supported.”

Here the airs are expressly called the pillars of heaven, and the pillars of the earth ; and the earth is said to be sustained by them. And the passage is, I think, a pretty evident proof of what the *ancients thought*. I

——— *Circumfuso pendebat in aere tellus
 Ponderibus librata suis.*

The weight of the globe of the earth is nothing, (says Mr. Hutchinson), because it hath no tendency or gravity to any point. Which is no bad comment upon *ponderibus librata suis*.

take

take the Word *Atlas* to be of Hebrew original; a noun from the verb **תלה**, *tele*, to hang, hang up; which supposes something to support the thing hung up. And this very word is applied to the earth by *Job*, chap. xxvi. 7. **תלה ארץ על בלימה**, *hanging the earth upon the spirit and light*; and with the א prefixed, it will be **אתלה**, *a.l.*, the supporter: whence *Atlas*, and the fable of supporting the earth on his shoulders. And give me leave here to observe, that the part of the earth which is turned into *day*, is in Hebrew called the *shoulder*, as it is also said to have its wings: and hence the Hebrew word **שכס** signifies the *shoulder*; and as a verb, to rise early, to be on the top or shoulder of the morning, or that which is turning from darkness into light.

CHAP.

C H A P. III.

Of the moon and her motions.

AS there is a continual flux and reflux of the aerial fluid from and to the sun, this must lay a stress and compressure upon the parts themselves, and every body placed in this expansion or firmament, not only in the direction in which the light and spirit move, but all around in every other direction; because, as all is full, and bounded at the extremity, the atoms and masses in their opposite motion from the centre, and from the circumference, must, by pressure against each other in their courses, produce a lateral and quaquaversal pressure.

As the earth is placed in the stress and fulness of the firmament, it must receive this pressure upon itself all around; and this is the cause of gravitation, which makes all bodies tend towards its surface with a velocity in proportion to their distance from it: for they intercept in that line the pressure which lies upon the earth, and take it upon themselves, and by that interception take off

off in proportion to their bulk some part of that pressure: and so the attraction, as the Newtonians call it, is mutual between a stone, in its descent, and the earth; the stone attracting the earth as much in proportion to its quantity of matter, as the earth does the stone in proportion to her's; that is, the stone takes off from the earth as much pressure as it receives.

This pressure must be stronger and stronger, the nearer the body approaches the earth; because there is less air to counterpoise the pressure, or the resisting column between the body and the earth is shorter than the column of pressure from above: and it will be less and less, the further the body is removed from the earth; because then the length of the column of air between increases, as the column above decreases: and at some certain distance from the earth this pressure must cease, and be nothing at all. What this distance may be, I pretend not to ascertain: but we may reasonably conclude, that the moon is within this pressure, and by it made to attend the earth in such a manner as to produce those different phases she shews us every month. I am inclined indeed to think, this pressure will extend so far as till lines drawn by the sides of the sun, and by the sides of the earth, meet behind the earth: and if so, the

the moon will be within this pressure; because the earth, when between the sun and her in an eclipse, casts a shadow that reaches beyond her orbit; and this shadow is terminated by lines drawn by the sides of the sun, by the sides of the earth meeting behind the earth: and as the mixture of light and spirit, and consequently the opposite pressures, become equal beyond this boundary, it is evident, that this pressure will increase in proportion as the moon is nearer to the earth, and decrease as she is removed further from the earth.

The present philosophers suppose, that the moon moves round the earth as the centre of her motion, much in the same manner, and by the same means of projection and gravity, as the earth moves round the sun; that she is carried along with the earth round the sun, by the progressive motion of the earth, while she is carried round the earth by the power of projection, and her gravity to the earth. And in their machines contrived to explain the planetary system upon gravitarian principles, she is represented to move in this manner. For, in the orrery, the little ball that represents the moon is fixed upon a pin or wire, and moves round a little circle that represents her orbit round the earth; and this circle, with the moon moving in it, (when

(when the orrery is set a-going), is carried round the golden ball that represents the sun, along with the ball that represents the earth. So that the conception which this machine, and what is said in their treatises of astronomy, give us of the lunar motions, must be, that she moves monthly in her orbit round the earth, while she and that orbit are carried round the sun in a year, by the earth's progressive motion. But, with due submission, I am inclined to think, that this is a wrong representation of the matter, and that the moon does not move round the earth in the manner described above, although she is in those different positions, with regard to the earth, which give her the different phases she by turns presents to its inhabitants.---I suppose then, that the motion is carried forward in her course round the sun, by a continued impulse at her western side, in the manner the earth is, as above described; and if she was so far distant from the earth as to be without that sphere of pressure towards that planet which is called her gravitation to the earth, she would move in a concentric orbit round the sun, as the other planets do; but being by her nearness pressed in every part of her orbit towards the earth, by the columns of air that surround and press upon the earth on all sides, its body interrupting the course of the ethers to and from
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the sun, and so receiving a pressure quæversum, in proportion to that interruption; I say, being thus within that sphere of pressure, and thereby tethered to the earth, her orbit cannot be concentric with the earth's orbit, but will cross it twice in every lunation; and she will sometimes follow the earth, sometimes precede it, sometimes be between it and the sun, and sometimes the earth will be between her and the

sun. Let *Fig. 12.* represent the paths of the moon and the earth intersecting each other; the dotted line representing the moon's path, and the other the earth's path. At NM the moon and earth will be in conjunction, or at the new moon, and the moon will be between the sun and earth; at 1 Q the moon will be behind the earth by a space equal to the radius of her orbit, or distance from the earth; at FM they are in opposition, or at full moon, and the earth is between the sun and her; and at 3 Q, her third quarter, the moon is before the earth, as far as she was behind it at her first quarter. Thus you have all the several phases of the moon, without her describing an orbit round the earth, in the time of her exhibiting them, such as the new Philosophy supposes her to do. But I may be told, that the moon, granting that she moves in such a curve as I have described, does as truly move round the

the earth, as she is represented to do in the common schemes, with the earth at rest. For in *Fig. 10.* which is an irregular, and not an exact delineation of *Fig. 10.* the moon's path, and where *m* is the moon, and *e* the earth; the moon accompanying the earth, does as truly move about it, as she would do in the circle *abcd*, with the earth at rest. But let the reader cast his eyes upon *Fig. 11.* where *m* is the moon, and *e* the earth, and *Fig. 11.* he will see, that by the same manner of reasoning, the earth may be said to move round the moon; for the case is exactly the same with the one as with the other, as appears from the sight of the two schemes.

The truth is, that their paths intersect each other, as represented in *Fig. 12.* which is taken from a delineation of *Fig. 12.* the moon's path, by the ingenious Mr. Ferguson, dedicated to the late worthy president of the royal society, Martin Folkes, Esq; For when the moon, in her annual path round the sun, is below, or nearer to the sun than that of the earth, the pressure towards the earth acting jointly with the impulse that impels and carries her forward in her orbit round the sun, makes her orbit or path to approach nearer and nearer that of the earth, (and the nearer they are, the more powerfully the pressure towards the earth acts),

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until it cuts it: and when, after this intersection, she gets above the earth's path, her pressure towards the earth acts in a contrary direction to what it did before, and in the same direction with her pressure towards the sun; and her tendency to the sun and to the earth acting the same way, they mutually contribute towards making her path or orbit bend by little and little towards the earth's path: and after she has passed her opposition with the sun, the pressure to the earth will have so far prevailed, as that her progressive impulse will begin to point towards another intersection of her path with that of the earth; and this pressure increasing as her orbit approaches that of the earth, her orbit will again intersect that of the earth; and so *vice versa*.

When I say, that the progressive or lateral impulse which carries the moon in her orbit round the sun, acts in conjunction with her pressure towards the earth, I mean, that this lateral pressure or impulse lies in a line that tends or points towards an intersection with the earth's orbit, as does the line NM I Q, *Fig. 12.* which is the case of the moon from her conjunction to her first quarter; from thence to her opposition or full moon, the lateral impulse is in a line that diverges more and more from the path or orbit of the earth: and so the pressure towards the
earth

earth acts in a contrary direction to the impulsive force ; *that* tending to press the moon towards the earth, *this* to make her go from it. But after she comes to full, then the direction of the lateral impulse is again changed, and acts in a line converging to the earth's orbit, tending or pointing towards another intersection with the earth's orbit ; and so the moon is impelled towards the orbit of the earth by her lateral impulse, as well as by her pressure towards the earth. For it is to be remembered, that the impulse of the spirit, which propels the moon, is exerted (as in the case of the earth described above) in the same line or direction with that of her orbit round the sun ; the spirit acting in the plane of the circle of illumination, or that circle which divides the enlightened from the darkened hemisphere ; and the path of her orbit lies in that plane.

When the earth was supposed to remain at rest immoveable any way in the centre, and the sun to move round the earth, as in the Ptolemaic system ; the moon was placed next the earth, and was described as revolving monthly round it. When this gave way to the Philolaic or Copernican system, (which in reality is a partial recovery of the Mosaic philosophy) ; though the earth and sun changed places, yet the moon kept its place next the earth, and its revolution

round it, which she was supposed to perform every month, whilst the earth moved in its orbit round the sun in the space of twelve months, or a year;—none of the revivers of this system taking time to consider, that the cases of the earth being at rest and in motion were quite different. For if the moon moves round the earth in the manner supposed by the present philosophers, her orbit will make loops, as in *Fig.*

Fig. 13. 13.: for whilst the moon is going round the earth, the earth is going forward in the ecliptic. And suppose the moon to be in her orbit at S 1, then, during the time she is moving round to S 1 again, the earth will have moved in the ecliptic from A to B; and therefore the moon, in order to get round the earth again, and be in the same position with regard to it as when she set out from S 1, must move in the line *dd*, and so to S 2, where she will be before the earth, as she was at S 1: for otherwise she will be left behind the earth when she should be before it, and so *vice versa*; and if her orbit makes loops, then, as Mr. Ferguson observes, the moon, when seen from the sun, would appear to be stationary at SS, and retrograde at RR. And if this is not the case, the moon must be carried along with the earth in its annual orbit round the sun, as projectiles are carried along by the earth's
progressive

progressive motion. And this, I think, is what the present philosophers suppose. But then I cannot see how her periodical and synodical month differ as they make it to do. I know they bring a scheme to prove it; which I shall lay before the reader, and then shew in what I think the proof defective. Let *S* (*Fig. 14.*) represent the sun, *E* the earth, *AB* part of *Fig. 14.* the ecliptic or earth's orbit, and *MNO* the moon's orbit round the earth, and let the moon be at conjunction, or new, at *N*. Now, say they, while the moon goes round her orbit in twenty-seven days, and a little more, the earth will have gone forward in the ecliptic about twenty-seven degrees, or almost a whole sign; and will have got to *e*, for instance: but the orbit of the moon, being, by supposition, carried along with the earth to *e* parallel to itself, will by that parallelism be then so situated, as that, when she has compleated her revolution, she will not be again in conjunction with the sun; that is, in a line that passes through her and the sun, but be at *p*, as in the circle *mno*: and therefore the moon, to come in conjunction again with the sun, must move on to *n*; which will take up two days, and a little more, the time by which they make her synodical month exceed her periodical.

But, with all due deference to their superior skill in mathematicks, this will not do their business, unless the earth stand still for these two days, or the moon moves so much faster than the earth, as to overtake it before it leaves its place at *e* : for if the earth goes forward at its usual rate for these days, it will be arrived at *q* by the time the moon gets to *n* ; and then she will be as far from a conjunction with it and the sun, as she was before at *p* ; the line *ql* not joining or passing through the earth, moon, and sun, any more than the line *ef* does.

But I must own I cannot see how the moon's orbit can keep parallel to itself, as they suppose it to do : for if a body be carried along with another body, with the same velocity and in the same direction with that other body, round a third body at rest, this body will remain in the same position with regard to the other two bodies during the whole time of the revolution. If the moon, for instance, was, from conjunction, to be carried along by the earth, in the same direction and with the same velocity itself has, round the sun, without revolving round the earth in her orbit, she would continue during the whole time in the same position with regard to the sun and earth. Suppose her, by the earth's progressive motion,

tion, to be carried (without moving in her orbit) from E to *e*; when she arrived at *e*, she would be in the same position or situation with regard to the sun and earth as she was at E: but she was in conjunction with the sun and earth at E; therefore she will be the same at *e*. And let her be in every other part of her orbit, and the case will be the same. Therefore her orbit doth not move parallel to itself; nor doth her synodical and periodical month vary, as they are supposed to do. They may contrive their orreries, and other machines, to shew it to be so; but this will not prove that it is so in fact.

In the above case, the moon is supposed to have no motion in her orbit, or round the earth; but if you suppose her to move round in her orbit, while she is carried along with the earth, the case will be the same. For if to the motion of the moon, whereby it is carried round the earth at rest, be superadded the same motion, both in regard to velocity and direction, as the earth itself has, she will describe about the earth the same orbit, with as great regularity as if the earth was indeed at rest; but if the earth was indeed at rest, the moon would complete her synodical in the same time as she completed her periodical month: *i. e.* suppose her from N, where she is in con-

N 4 junction

junction with the sun and earth, to revolve round her orbit the earth being at rest; when she came to N again, she would again be in conjunction with the sun and earth. Therefore, as the revolution of the moon round the earth (she being carried during the time with the same motion as the earth, both in regard of velocity and direction) does no more affect her, than the projection of a body into the air affects it; but the body will fall in the same relative place as if the earth was at rest; therefore, I say, the moon, after every revolution round the earth, will be found in the same place and situation, with regard to the sun and earth, as she was in when she begun her revolution; and therefore her synodical and periodical month will be the same. Let AB

(Fig. 15.) be a portion of the
 Fig. 15. ecliptic; if the moon was to move round the earth at rest, her change would be at *a*, her first quarter at *b*, her full at *c*, her last quarter at *d*, and her change at *a* again. Now, suppose, while the earth goes forward in the ecliptic from E to *d*, that the moon moves a quarter of her orbit; then, as she is carried along with the earth with the same velocity and in the same direction, when the earth arrives at *d*, she will be at E; and when the earth is at *f*, she will be at *g*; and when the earth gets to *h*, she will be at *i*; and when the
 earth

earth comes to *i*, she will be at *K*, in conjunction with the earth and sun, as before at *a*. Q. E. D.

If the orbit of the moon intersected the orbit of the earth constantly in the same place, during her annual revolution round the sun, her nodes, her apfides, her apogee, perigee, syzygies, and such like, would remain the same, and not vary or change; and there would be no eclipses either of the sun or moon. But as the moon accompanies the earth, which is itself in motion, and by her different positions, at different times, with regard to the earth and sun, as she is carried round that luminary, is variously acted upon by the light and spirit, and by the pressure which tethers her to the earth, and by that which retains her in her orbit round the sun; her path is thereby made to intersect the path of the earth in different places, sometimes nearer full and new moon, sometimes further off, and so intermediately: whence, of necessity, she must come to her full and change in different parts of her orbit; her apogee and perigee, or greatest and least distance from the earth, must change; her nodes will go back, and her apfides go forward; and all the other anomalies and variations to which she is subject, will arise. And these will be caused by the different

ferent degrees of pressure towards the sun, and towards the earth, at different times acting differently upon her : for these pressures whereby she is pressed towards the sun and earth, act sometimes stronger, sometimes weaker ; act sometimes in conjunction with each other, sometimes in opposition to each other ; and sometimes their forces or impulses are direct, and sometimes oblique, according to the different distances of the moon in her several aspects. And I hope it may be as intelligible and satisfactory, to have recourse to the different force of the pressure of the moon and earth towards the sun, to account for her variation, as to the different force of gravity ; especially as the Newtonians seem now willing to allow, that the impulses of an ethereal medium are the cause of gravity.

The moon, from her change to the end of her first quarter, loses something of her swiftness ; in her second quarter, from the quadrature to her opposition, or full moon, she increases in velocity ; in her third quarter, from opposition or full moon, to her last quarter, she again loses of her motion ; and from that quarter, to the conjunction or new moon, she again recovers her swiftness : and also in the second and third quarters, her orbit is more concave or curve than that of the earth, and consequently she is further from the earth ; and
in

in her fourth and first, her orbit is less curve than the earth's orbit, and consequently she is nearer the earth. This difference of velocity in the moon, is called her *variation*, wherein she contradicts the laws of the motion of a planet in an elliptic orbit, by which she should describe areas proportionable to the times of description. And this variation was first discovered by the Noble Tycho, and supposed by him to arise from a certain libratory motion backwards and forwards, whereby the moon is alternately accelerated and retarded. Sir Isaac Newton accounts for this variation, from the difference of the forces of the gravity of the moon and earth to the sun, arising from the different distances of the moon in her different aspects; the one force acting in the way, or contrary to the way of the moon about the earth; the other acting in the line to or from the earth: the first causing the moon to describe a larger or smaller area in the same time, according as it tends to accelerate or retard her; the other changing the form of the lunar orbit from what it ought to be, merely from the moon's gravity to the earth; and both together making up that inequality which is called the variation. If the Newtonian reader will be pleased to substitute, in the room of the force of gravity, the impulse or pressure of the spirit, he may account for

for this variation mechanically, by his master's own method of reasoning. For if the impulsive force or pressure of the spirit at the hinder part, or dark hemisphere of the moon, and the pressure of the spirit on the hinder part, or dark hemisphere of the earth, were to act alone, without either the moon or earth having any lateral impulse; the moon and the earth would thereby be impelled towards the sun; but with different degrees of velocity. At the conjunction, the moon being nearer to the sun than the earth, would gain upon the earth every moment, and get more and more out of that sphere of pressure which chains her to the earth. At the opposition, the earth being nearer to the sun than the moon, would gain upon the moon, and endeavour to leave her behind it. And at the quarters, the moon and earth being about the same distance from the sun, would be impelled towards it with equal velocity; and would approach nearer and nearer to each other, until they met at the sun: whereas, at conjunction and opposition, they would recede further and further from each other in their approach to the sun. Now, it is a law of the Newtonian philosophy, that the power which tends to separate the moon from the earth will abate the velocity of her motion, and that which tends to make her approach to the earth will increase her

her velocity ; and therefore from the points where the impulse or pressure of the spirit on their dark hemispheres acts in such a direction and manner as to bring the moon and earth nearer and nearer together, to the points where the impulse of the spirit begins to have a contrary tendency, namely, to separate her from the earth, the moon will be accelerated in her motion ; and from the points where the action of the spirit on their dark hemispheres tends to separate the moon and the earth, to the points where the spirit acts in a contrary tendency, namely, to make the moon approach to the earth, she will be retarded in her motion : and, consequently, her velocity will be increased from her last quarter to conjunction or new moon, and from her first quarter to opposition or full moon ; and diminished in the same proportion from conjunction or new moon, to the first quarter, and from opposition or full moon, to the last quarter ; and at new and full, her orbit will be flattened, and she will, other things being equal, be nearest to the earth ; as her orbit will be more curve, and she, other things being equal, will be farthest from the earth at the quarters. And these variations will chiefly take place in the octants, as I find Mr. Machin has observed.

“ It is very surprising,” says Dr John Keil, “ that the moon, which of all the
“ heavenly

“ heavenly bodies is the nearest to us,
 “ should be of that difficult access ; and
 “ that it should be so hard to find out her
 “ ways, and the causes of all her irregula-
 “ rities.” — As her ways are so hard to
 find out, I shall content myself with this
 general account of her motion, and not en-
 ter into further particulars. No doubt but
 the different streams of light from the other
 planets break in upon the sphere of pres-
 sure, and so make some alteration in the
 force by which she is pressed to the earth,
 as I suppose they have some such effect
 upon the sphere of pressure whereby the
 earth is retained in its annual orbit round
 the sun ; but in what manner or degree, I
 leave to future discoveries to ascertain.
 “ The greatest part of the theory of the
 “ moon,” says Mr. Machin, “ is laid down
 “ without any proof ; and those proposi-
 “ tions relating to the moon’s motion which
 “ are demonstrated in the *Principia*, do
 “ generally depend upon calculations very
 “ intricate and abstruse ; the truth of which
 “ is not easily examined, even by those
 “ who are most skilful ; and which how-
 “ ever might be easily deduced from other
 “ principles.” And in another place he
 says, “ It seems to me that there is more
 “ force necessary to account for the motion
 “ of the moon’s apogee, than what arises
 “ from

“ from the variation of the moon’s gravity
 “ to the sun, in its revolution about the
 “ earth ; neither is there any method that
 “ I have ever yet met with, upon the com-
 “ monly received principles, which is per-
 “ fectly sufficient to explain the motion of
 “ the moon’s apogee.” These quotations

are taken from a piece designed to supply what was wanting in the theory of the moon, as it is a speculation founded on a physical cause ; but in which, for want of time, the author did not succeed to his wish, as he most ingenuously acknowledges.

—How happy is it, that what is of immediate use to mankind, concerning the motion of the moon and earth, may be known by comparing the observations of former ages with those of the present, and does not depend upon the knowledge of the physical cause !

I shall conclude this chapter, with offering a conjecture concerning those appearances on the surface of the moon, which the vulgar take for eyes, nose, and mouth, and philosophers for sea and land.

The face of the sun viewed through a telescope, makes an appearance not much unlike that of the moon. It is distinguished and diversified with a great variety of maculæ or spots ; some parts having a most
 lucid

lucid brightness, others being of a dark and dusky colour. None indeed could ever dream, that these were seas and land, or that this luminary was habitable *; and so must necessarily be led to have other thoughts of these

* I ought to beg pardon for pretending to limit the human imagination, especially in matters of philosophy: for I find, that Cardinal Cusa is of opinion, that not only the moon and planets are worlds, but that the fixed stars, and also the sun itself, are worlds, and inhabited; each by inhabitants suitable to their respective planets. I will beg leave to set down his words. *Susplicamur in regione solis magis esse solares, claros, et illuminatos intellectuales habitatores, spiritualiores etiam, quam in luna, ubi magis lunatici; et in terra magis materiales et crassi: ut illi intellectualis naturæ solares sint multum in actu, et parum in potentia; terreni vero magis in potentia, et parum in actu; lunares in medio fluctuantes. Hoc quidem opinamur ex influentia ignis solis, aquatica simul et aerea lunæ, et gravedine materiali terræ; et consimiliter de aliis stellarum regionibus, suspicantes nullam habitationibus carere, quasi tot sint partes particulares mundiales unius universi, quot sunt stellæ, quarum non est numerus, nisi apud eum qui omnia in numero creavit.*

“ We conjecture,” says he, “ that the inhabitants of the
 “ the sun are, like the nature of that planet, more clear and
 “ bright, more intellectual and spiritual, than those in the
 “ moon, where they are nearer to the nature of that duller
 “ planet; and those in the earth are more gross and material
 “ than either: so that these intellectual natures in the sun
 “ are more form than matter, those in the earth more mat-
 “ ter than form, and those in the moon of a middle nature
 “ between both. And this we opine from the fiery influence
 “ of the sun, the watery and aereous influence of the moon,
 “ and the material heaviness of the earth. And in some
 “ such like manner it is with the regions of the other stars;
 “ for we suspect, that none of them are without inhabitants,
 “ but that there are so many particular worlds and parts of
 “ this one universe, as there are stars, which are innume-
 “ rable, unless it be to him who created all things in
 “ number.”

these appearances in the face of the sun, than of those in the moon. But to every unprejudiced person it will at least seem probable, that they are owing to a similar cause. But I shall be told, That the sun has the appearance of fire and flame, which the moon has not. To which I answer, That so the thing ought to be : for at the orb of the sun, the matter of the heavens is really in the condition and action of fire ; fresh spirit being continually pressed in, as that which is dissolved is pressed out in flame and light ; the pure ether breaks in pieces the dense air, the gross air disperses his light, as Job expresses it. And these masses of coagulated air pressed into the solar fire, I suppose to be the cause of the dark appearances in its body ; in some such manner as the supply of fresh fuel to a culinary fire obscures its brightness in those parts to which the fuel is applied, until it dissolves it, and the fire burns up with increase of brightness. Now, the orb of the moon receiving her light at second hand from the sun, the action of the light and spirit on her surface must be weaker, and consequently the lucid parts of her body will not have so bright and vivid an appearance, as those in the face of the sun : and those parts where the spirit flows in, may also have a different aspect from the maculæ of the sun ; since the action of reflection cannot be in the same

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degree,

degree, or have the same effects, as the action of fire itself. The other planets too have some such like appearances, though, by reason of their situation and distances, they vary from each other. But," says Dr. Keil, "if there were no parts in the moon
 " higher than the rest, no prominent points,
 " then a right line in the dichotomy or quadratures, and an elliptic line in all other
 " phases, would terminate the light and
 " dark parts of the disk. But when the
 " moon is viewed with a telescope, we find
 " that there is no regular line which separates light and darkness in the moon's
 " surface; but the confines of these parts
 " appear as it were toothed, and cut with
 " innumerable notches and breaks; and
 " even in the dark part, near the borders of
 " the lucid surface, there are seen some small
 " places enlightened by the sun's beams:
 " and upon the fourth Day after new moon,
 " there may be perceived some shining
 " points, like *rocks* or small *islands*, within
 " the dark body of the moon; but not far
 " from the confines of light and darkness,
 " there are observed other little spaces which
 " join to the enlightened surface, but run
 " out into the dark side; which by degrees
 " *change their figure*, till at last they come
 " wholly within the illustrated face, and
 " have no dark parts round them: afterwards we observe many more shining
 " spaces

“ spaces to arise by degrees, and to appear
 “ within the dark side of the moon, which,
 “ before they drew near to the confines of
 “ light and darkness, were invisible, being
 “ without any light, but wholly immersed
 “ in the shadow. This is observed in the
 “ increasing, and the contrary in the decreasing
 “ phases. Now, it is impossible that
 “ this should be, unless these shining points
 “ were higher than the rest of the surface,
 “ so that the light of the sun may reach
 “ them. These shining points are the tops
 “ of very high mountains. Besides these,
 “ we likewise observe even in the illuminated
 “ face of the moon, many dark and
 “ obscure spots, which seem to be only caverns,
 “ or large cavities ; on which the
 “ sun shining very obliquely, and touching
 “ only their upper edge with his light, the
 “ deeper places remain without light: but
 “ as the sun rises higher upon them, they
 “ receive more light, and the shadow or
 “ dark parts grows smaller and shorter, till
 “ the sun comes at last to shine directly upon
 “ them ; and then the whole cavity will be
 “ illustrated, and the parts which were obscure
 “ before, will then look as bright as
 “ the tops of the mountains. From these
 “ constant observations, it is plain to a demonstration,
 “ that the moon’s face is covered with mountains
 “ in some places, and that in others it is cut with deep pits and
 “ caverns.”

“caverns.” The design and drift of this is to prove, that the moon may be a world; and if it is a world, it must have inhabitants; and these inhabitants, if of the human race, I presume, must have cities to dwell in; and if they have cities and towns, it is plain, I think, to a demonstration, that they would be as visible through a telescope as these mountains and caverns which they pretend to discover so clearly: for a city, as large as London or Paris, might surely be as easily discerned, as any of these prominencies they pretend to measure to such exactness. But this by the way. I shall now endeavour to shew, that, upon my hypothesis, the moon ought to have, and naturally will have such like appearances of brighter and darker parts, from the action of the light and spirit upon its surface; and which, by a prepossessed imagination, may be improved into mountains and caverns, and perhaps into towns and cities, if the hint was given by a proper person. Whether the surface of the moon be even or uneven, I pretend not to determine. No doubt it was formed in such a manner as best to answer the end for which it was designed. And it may be uneven and scabrous, and yet be no habitable world. However, the light from the sun will act upon it with the same force with which it comes from the sun, and strikes upon it: and as the spirit rushes into the place of the
light

light in proportion to the force with which the light irradiates, the light and spirit will act upon the surface of the moon in the same manner, though not in the same degree, as at the sun ; and the light, by its reiterated reflections and rebounds from the surface of the moon, forms that cap of light next the sun, with thin edges and a thick crown, which rises above, and appears larger than the dark side of the moon. We may have some idea of this bustle and commotion, from a current stopped by a dam, or any other obstacle ; or from a mill-race when it is turning the great wheel : the water, as it comes against the obstacle, is beat back again, and put into a great cumbustion, if I may be allowed the expression, and forms little frothy waves ; and if the dam or obstacle is not too high, some of these little waves will break over it. To this bustle and repercussive motion of the light, I suppose, it is owing that a right line does not terminate the light and dark parts of the disk of the moon in the dichotomy or quadratures, and an elliptic line in the other phases ; but that the light breaks out into notches and teeth, and that the edge appears ragged and jagged. And this is more visible on the confines of these parts, because it is there that the spirit acts, and is every now and then breaking into the light, as the light

does into the spirit; which may also be the cause of those shining points which are observed within the dark body of the moon, but not far from the confines of light and darkness. And the dark and obscure spots, which are observed in the illuminated face of the moon, are the places where the spirit blows into day, as the scriptures express it, in speaking of the earth; and these spots or dark parts grow smaller and shorter, as the action and friction there divide the grains of the spirit, and reduce them into light. That the light and spirit should form such like dappled appearances as are observed on the face of the moon, cannot seem strange, if we consider, that the whole art of perspective depends upon light and shade; and that to the different application of them, and to their gradual attenuations and different degrees of strength, are owing those pleasing deceptive appearances of objects upon a plain surface, which we have in painting and ingravings.

I cannot here omit making a reflection upon what the moderns tell us of the ancients. They say, that the Chaldeans, in two thousand years time, did not know that the moon was an opaque body, and received her light from the sun; and yet, at the same time, acquaint us, that they were most diligent

diligent observers of the heavens: which I cannot help thinking a little inconsistent, when, for some days before, and some days after the change, the body of the moon is visible to the naked eye, with a border or edge of light swelling above her dark side, and increasing, until she shews her full face, or whole enlightened hemisphere.

C H A P. IV.

Of the sun standing still, Josh. x. 12. 13.

THen spake Joshua to the Lord in the day when the Lord delivered up the Amorites before the children of Israel, and he said in the sight of Israel, Sun, stand still upon Gibeon, and thou moon, in the valley of Ajalon. [שמש כוננעון יום וירח בעמק אילון]. And the sun stood still, [יום], and the moon stayed, [עמר], until the people had avenged themselves upon their enemies. Is not this written in the book of Jasher? So the sun stood still in the midst of heaven, [ויעמר השמש בחצי השמים], and hastened not to go down for a whole day.

The construction of this passage has been one of the greatest obstacles to the recovery of the principles of the true philosophy, of any thrown in the way. While the earth was supposed to stand still, and the sun to move round it, scripture and philosophy walked hand in hand; and no one made the least doubt but that the Bible spoke as strictly true in philosophical points, as it did in those

those relating to history, geography, and chronology. When the discovery of the motion of the earth made a breach in the union between scripture and philosophy, people had then so high a veneration and reverence for the word of God, that they durst not think it accommodated to the false conceptions of the vulgar in its philosophy, more than in any other point; as judging such an opinion derogatory to the honour and value of the sacred oracles, and as tending to weaken the authority, and put in question the divinity of the whole book: and this made them rather chuse to abide by the Ptolemaic system, than give up their Bible. But at the last, what by the repetition of experiments to prove the truth of the Copernican system, and what by the pious labours of philosophic divines, in order to convince us, that the design of the scriptures was not to instruct us in natural, but in divine knowledge; and that those texts which speak of the sun as moving, and of the earth as standing still, were not to be taken in the strict propriety of the words, or philosophical verity, but according to the appearance of things, and the vulgar notions and opinions which men have of them; our scruples were removed, and we can now coolly give up the philosophy of scripture, which is almost two thirds of our Bible, and yet devoutly believe the whole

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whole to be the unerring word of God. After this notion of the scripture being adapted *ad captum vulgi* in its philosophy, became the general opinion of the age, and the doctrine of the pulpit as often as divines had occasion to treat of such matters; it could not be expected, that any one would go to the Bible in quest of philosophy, or pay any regard to what it said upon physical subjects: so that we were left to ourselves to set up what *principia* we pleased, and to propagate them as the true philosophy. And I am much mistaken, if this has not contributed more than any other cause to lessen the authority and influence of the sacred records; and this is now so rivetted in our minds, that the very mention of the scripture-philosophy is treated with an indignant contempt; and the philosopher appeals to the divine for the absurdity of the notion.

I am inclined to think, that this text has not been fully understood, either by those for, or by those against the motion of the earth; each party taking it for granted, that the orb or body of the sun was what was meant in the text; whereas שמש, *shemesh*, the Hebrew word here used, whatever may be its derivation, is not the sun itself, but the solar light, or that flux or stream which hits the earth, and is continued from thence to the sun. That it is not the body or orb
of

of the sun, is plain from this very text alone *: for the sun is commanded to stand still upon Gibeon; but the body or orb of the sun was not there to obey the command, and stand still; but the solar light was there, and stood still, and stayed there; and this was the thing required by Joshua, and to what he spoke. And if the solar light acting upon the earth, be the cause of the motion of the earth, then speaking to it, to cease that action, is more proper than to speak to the earth, which is only passive in the case; for stopping that action would of course stop the motion of the earth. As it is the solar light which was commanded to stand still on Gibeon, so it is the lunar

* There are other texts which fix the meaning of this word; as, 1 Sam. xi. 9. *To morrow by that time the* [שמש] *sun is hot*; and Neh. vii. 3. *Until the* שמש *be hot*; and Exod. xvi. 21. *And when the* [שמש] *sun waxed hot, it (the manna) melted.* So Jonah iv. 8. *The* [שמש] *sun beat upon the head of Jonah.* Psalm cxxi. 6. *The* [שמש] *sun shall not smite thee by day, nor* [ירח] *the moon by night.* In all which places the orb or body of the sun cannot be intended; neither can the expressions be properly applied to it: but may most properly be applied to the solar light; and is strictly true of it, as it hits and acts upon the earth, and creatures, in light, heat, and all its other effects; as the streams or fluxes, from the sun and orbs, were ordered to do, Gen. i. 15. viz. [להאיר] to act the part of light, &c. upon the earth. For though the body or orb of the sun has light and heat, and though the stream or flux of atoms between it and the earth, is light and heat; yet no part but that which touches the earth, is light or heat to the earth: and both are increased by the friction and agitation of their parts at the earth's surface.

light

light that is spoken to, to stand still in the valley of Ajalon. That ירה, *ireh*, the word used here, is the reflected light of the moon, and not her orb or body, a single text may, I think, determine, viz. Deut. xxxiii. 14. *For the pretious things put forth by ירחים, the moons, plural; which shews it cannot be the body or orb of the moon: for this is but one singular; but the fluxes or streams of reflected light are several, and severally reflected to us, from the several phases of the moon. So chap. iv. 19. the שמש, shemesh, ירה, ireh, and כוכבים, cocabim, are said to be divided, or proportioned out unto all nations under the whole heavens; which expression, though it is not, with any propriety, applicable to the bodies of the sun, moon, and stars, is literally true of the fluxes or streams of light from them.*

There are three other Hebrew words, which I must beg leave to explain, namely, רום, עמר, and חצי. רום, rendered, *stand still*, in the margin, *be silent*, is to cease from that action in which the agent spoke of is supposed to be employed. See Hammond upon Psalm iv. 4. * and Psalm cvii. The word,

* *Silentium sæpe in scriptura sumitur pro cessatione; et silere pro cessare, aut desistere: simile quod habemus in nostra vernacula lingua, cum eum qui nobis molestus est, etiam factis, quamvis nihil dicat, tacere, id est, cessare, jubemus. Sic Jud. xviii. 9. Et*

word, as a noun, is used for a calm, **יָקַם סְעָרָה לְרַמְמָה**, *He (God) maketh the storm a calm.* So the word, in this place, applied to the solar light, is, to cease acting upon Gibeon in its usual manner. The writers of the New Testament make use of the like phraseology; as, *Mark iv. 39. And Jesus said to the sea, Σιωπα **, *Be silent; πεφιμωσε, be mute: and there was a great calm.* **עָמַר**, as a verb, signifies to subsist or be subsisted, to sustain or be sustained, to support or be supported; or to support, and so sustain or make subsist, whatever is the subject of which it is spoken. As a noun, it is used for the pillar or column of the cloud and fire, which was miraculously supported, so that the common actions of wind, or such like, did not dissipate or drive the parts of

9. *Et vos filetis, id est, cessatis. Sic Jer. xxxviii. 27. Siluerunt ab eo, id est, desierunt interrogare. Sic Latinis silentes, item coetus silentium sunt manes. Virg. Silet rex ipse silentium. Ita Latinis, Inter arma silent leges. Middorch's Leigh's critica sacra, under the word **דָּוִם**.*

The word *silentium*, and its verb *fileo*, are also applied, in some such manner as **דָּוִם** is here in the text, to subjects wherein the light is either not in action, or where its action is but small and weak; as *luna filens* in Pliny; and *silentia lunæ* is Virgil; which are expressions for the new moon, whose dark hemisphere, or that where the light is not in action, is turned towards us. So *severa silentia noctis* in Lucretius; and *nox, et Diana quæ silentium regis*, in Horace, are descriptive of the night, wherein there is but a very small degree of that action in which light and day consist.

* The word **דָּוִם** is in this place rendered by Aquila,

σιωπα.

of the cloud by day, or of the fire by night, from over the camp of the Israelites. And this is a case in point; for the solar light upon Gibeon was so supported, that the spirit could not push into it, cause it to recede, and so take hold of the wings of the earth to give it motion as usual. And *Jonah* i. 15. it is used for stilling the raging of the sea; **ויעמר הים מועמו**. *And the sea ceased from her raging.* So the word applied to the solar and lunar lights, will signify, that these two fluxes ceased, upon the command to be silent or still, from the action in which they were before, (as the sea ceased from her raging), and were supported in that condition; so that the solar light did not spring out, and draw in the spirit; neither did the spirit break in upon the light, and make it recede or spring out, and so give room for fresh light to come in, and for the spirit to take its place, and so move the earth. The consequence to the earth was, that it was arrested in its course; and to the moon, that her orb was stopped from *walking in brightness*, as Job beautifully expresses it. The noun **חצי** comes next under consideration. The verb **חצה** signifies to divide, or cut off a segment, without regard to equal or unequal parts, unless determined by the context; see *Marius de Calasio*. So I take it here to be used for that moiety of the heavens which corresponded or answered to the
line

line of intersection of the light and darkness, or the solar horizon upon the earth: for Gibeon, as I suppose, was near that line where the solar light was commanded to be still; and it stayed in the correspondent line of the heavens. For one intent of the miracle was, that the enemies might not escape alive, by favour of the night: and there seems the less reason for a miracle to make the solar light stay, when it would have continued many hours above the horizon without one. For the miracle is generally supposed by Christian writers, to have happened about ten or eleven in the morning, in the month of April, or thereabouts; and by the Jewish, upon the 8th of June, O. S. So that, without any miraculous supply of light, there would have been day-light, in the ordinary course of nature, for seven, eight, or nine hours. But to see the solar light just ready to go off, and yet stay upon Gibeon for the space of almost a whole day, in defence of whose inhabitants the Israelites were fighting; and this done for the sake of the servants of the true God, and the destruction of the worshippers of the host of heaven; for such were the five confederate kings,—was a miracle necessary for the completion of the victory, and *dignus vindice nodus*.

It

It is evident from the words of the text, that it was the solar light at that time acting upon Gibeon, which was commanded to stand still; and if that light obeyed the command, and stayed, this implies, that the earth did not move; in the same manner as Solomon saying, that the solar light springs out, and goes off, implies, that the earth turns round: because, if the earth had proceeded in its usual motions, diurnal and annual, or in either of them, that stream of solar light would be shifted off, and left behind the earth; and so would every successive column of light as it came on. So by the lunar light being commanded to stand still upon Ajalon, and by its staying there, we may conclude, that the motion of the orb of the moon was thereby arrested: for had her orb gone on in her usual course, the lunar light would not have stayed on Ajalon, but have shifted its station. And as the lunar light is none other but the solar light which acts upon the orb of the moon, and is thence reflected to the earth; it seems as if stopping the action of that light on Ajalon, and staying it there, would also stop its operation upon the lunar orb, and prevent its shifting off the edge of that orb, and so giving way to the impulse of the spirit there; which, as in the case of the earth, would stop her motion. However, I think
it

it is implied, that her motion was stopped, by the lunar light staying on Ajalon, as the motion of the earth was stopped by the solar light staying on Gibeon: and as it is the solar and lunar light which then actually were in those places of the earth, which Joshua commanded to continue in *statu quo*, it precludes all suspicion of any *deceptio visus*, or of any mock-suns or parelia, which some commentators have proposed as a solution of the miracle.

It has been shewn above, that there is a greater friction or action of the light at the evening edge of the earth, than at the morning; that this occasions a continual draught of spirit or air there; and that this draught gives the earth its motions, both diurnal and annual. If therefore this friction and action of the light there was to be superseded and cease, the draught of the spirit would thereupon be stopped, and the earth would of course stand still; in some such manner as the water-wheel of a mill would cease to be turned round, if the dam or race was turned aside, or stopped; or as a ship under sail would lose its motion, if the action of the wind upon her sails was to cease: and the staying of the solar light upon Gibeon, would as effectually turn off the spirit, and thereby hinder it from moving the earth, as shutting down the sluice-

P gate

210 An ENQUIRY after Ch. 4.
 gate turns off the water of the mill-race,
 and prevents it from moving the cog-wheel.
 It is this friction and action of the light at
 the evening-edge of the earth, which I
 suppose was superseded by the command
 to the solar light to be silent, or still, Heb.
 ויחל; and in consequence of this it עמד,
 stayed upon Gibeon, which was the cap or
 edge of the earth where the spirit and solar
 light were acting and moving the globe:
 and if the solar light ceased to act, and stay-
 ed there, the draught of the spirit must
 stop of course; and the effect of the action
 of the solar light and the spirit, that is, the
 motion of the earth, would cease likewise.

Let T (*Fig. 16.*) be the earth,
Fig. 16. S the sun, and the dotted lines LS
 the grains or masses of the spirit
 in their return to the solar fire to be ground
 into light; which, in their way, are
 שואב, sucked or drawn into the cap of
 light c, and into the column of light turned
 behind the earth, as it goes forward; which
 may be represented by the white ground
 between the black strokes or dotted lines.
 Let ESW be a column or cone of light in-
 terrupted by the hemisphere next the sun,
 and by that interruption put into a new ac-
 tion, by which its condition is rendered
 different from that part of the firmament
 next before the earth at E, out of which it
 was

was formed; and which before the earth entered it, was in the common degree of light: and EDW a column of darkness interrupted by the opposite hemisphere of the earth, and by that interruption put into a different condition from what it was before the earth entered it; the parts of it being more compressed and condensed by the light being hindered from mixing with it, and by the smaller massulæ pervading the earth, which the grosser cannot do. Now, the earth, as it goes forward from W to E, is continually leaving such a column of light, and such a column of darkness, behind it; and the spirit in the lower part of the column of darkness left behind the earth, and that spirit behind the lower end of the column of light also left behind the earth, push into the part of the column of light the earth hath left behind, and into the edge of the cap of light the earth hath turned behind; and the one propels, and the other turns the earth, as described above. And the earth will continue to move from W to E; because the air behind it, or at the evening-edge W, is constantly kept in a different condition from the air before it, or at its morning-edge E, where it always remains in the common state, or nearly equal mixture of light and spirit. Now, suppose the stream or flux of solar light at the evening-edge, at WG, to

cease that action which makes room for a sufficient draught of spirit; then, instead of pushing into the cap of light, and into the vacuum made by the column of light left behind the earth, and so turning and propelling the earth, it would go on, in strait lines, to the sun, as it does at the morning-edge, in the lines *ls*; and would continue to do so, while the stream of solar light *SG* staid at *G*, upon Gibeon for instance: for the pressure of the columns *ESW*, *EDW* being equal, and no push at *W*, neither rotation nor progression could ensue, but the globe of the earth must stand still; and commanding the solar light to be silent, and to stay upon Gibeon, produced this effect. If it be said, That the spirit, represented by *ill*, might push into the solar light at *E*, where it is supposed to be in its usual action, and turn the globe round from *E* to *W*, though it could not give it progressive motion; I answer, That the spirit at the morning-edge, at *E*, would not be liable to be sucked or drawn in there; because there is no such heat or friction of the light, so no such draught there, as there is at the evening-edge; the firmament being in its common condition of nearly an equal mixtute of light and spirit: whereas at the evening-edge, the column of light left behind the earth in its progressive motion, and the cap of light, turned behind in
its

its rotation, make a constant draught there; which is the cause of the spirit's action upon the earth, both as to its progression and rotation; and it is the part of the cap of light turned behind, into which the spirit pushes, to give the earth rotation; the cap of light being more rarefied at the evening-edge, because the solar light has operated all along from the hindermost edge to the meridian, every line having lately been a meridian: whereas, at the morning-edge, just the reverse has been the case, every line having lately been immersed in darkness; so that the spirit pushes into night at the morning edge, but into day at the evening. But supposing, for the present, that the spirit might push in at E, yet it would not be able to give the earth rotation; because, to do that, it must turn E from, and W towards the sun, or into the light: but it could not do this, whilst the solar light staid upon Gibeon; because it is the reaction, reverberation, or diverging of the light, which gives liberty to the one edge of the earth to be turned into the light, as the other is turned out of it: and as the solar light in the line SG, did not react as usual, it must press upon that edge with an increase of force, which no impulse that naturally can be supposed at E, would be sufficient to overcome; and while the solar light staid, and remained dammed up, (if I may be al-

lowed the expression), so as the spirit could not break into it, which I think is implied in the Hebrew words רוּחַ and עֶמֶר, the globe would remain without either rotation or progression. And if any of the spirit was drawn in at E, it would skim horizontally over the face of the earth from E to W, and serve as gentle breezes, and make the vapours descend, perhaps in dews, to fan, cool, and refresh the air; and abate the heat, that may be supposed in those parts to which the sun was then vertical. It may also be asked, After the injunction was taken off, and the light acted as usual upon Gibeon, what was there to give the spirit acting at W a prevalency over the spirit acting at E? that is, Why might not the action of the spirit at E move the earth from E to W, as well as the action of the spirit at W move it from W to E? for as the earth was to begin its motion again from rest, what was there to determine that motion in the one direction rather than in the other? I answer, That the shifting of the column of solar light, which had staid thus long upon Gibeon, would make a new draught of spirit at W; and, for the reasons above, there could be none at E: and therefore, as soon as ever the solar light began to recede, and admit the spirit, or as soon as יוֹם לַעֲרֹב רַפָּה, *the day yielded*, or *gave way to the evening*, as the scripture expresseth

preſſeth it, *Judges* xix. 9. ; the ſpirit was ready, and would ruſh in, purſue the light, and give rotation and progreſſion to the earth, as before.

I am aware of objections that will be made to this account of the miracle. It will be ſaid, that the ſudden ſtoppage of the earth would occaſion inundations, and overturnings of buildings, and a general confuſion. But ſuch objections as theſe take their riſe, I think, from our prejudices concerning motion. We conceive that a body once put into motion, will continue to move on after the power which put it into motion leaves it ; and that it will preſerve its motion, without the leaſt diminution, until ſome other thing put a ſtop to it. In this caſe, indeed, the earth muſt have received a violent ſhock, when either its rotation or progreſſive motion, or both, were ſuſpended ; becauſe the force ſufficient to ſtop theſe motions muſt, at leaſt, be equal to the force with which it was then moving. But this is a wrong ſtate of the caſe. For the earth moves in a plenitude of matter, which ſtrictly embraceth it on every ſide ; and the agent that moves it is in continual contact with it, as all its conſtituent parts are with one another, as well thoſe before, as thoſe behind the earth, and on every ſide. Its motion is ſtopped, not

by any force applied to its foremost side, or by any obstacle thrown in its way which it cannot remove or surmount, but by the fluid agent in contact with it ceasing to impel it behind. And it may be compared to a body moved along or turned round with the hand, or any other thing in continual contact with it, not by jerks, but by a constant equable motion. When the hand stops, the body is stopped, without any the least shock to itself, or to any thing placed upon it. In like manner, a ship, when becalmed, is stopped, without any inconvenience or detriment to itself, or any thing aboard. Besides, that which keeps the waters from overflowing the earth, and buildings, and every thing else in their proper situations, is the expansive and compressive force of the firmament, which Job calls *the garment and swadling-band of the sea*: and this suffered not the least alteration from the stoppage of the earth; but acts in the same manner, whether the earth be in motion, or at rest.

But some will ask, *Cui bono? cui usui?* To what end, to what intent was this miracle? Let us suppose what the scriptures abundantly prove, that the men of those days, like others of a later date, had got it into their heads, that there were some incommunicable powers or properties inherent

rent or superadded to matter; or that this machine acted independent of Jehovah. Was it not of use, was it not for their good, to reclaim them from these false notions, and to set them right in this important affair? And how could this be done, but by controuling nature, and thereby shewing that it was at the beck of its Creator, to be made an instrument in his hands to destroy its own worshippers and votaries, and to support the faithful servants of Jehovah? The heavens, as a machine, could not be destroyed, without putting an end to all nature. But they could be made to act, at the command of a delegated person, contrary to their ordinary operations: and this was convincing evidence, even to demonstration, that the heavens were not, what their worshippers took them to be, a god, but the workmanship of God; and that God was Jehovah, the maker of heaven and earth. It was shewing these airiators, that the heavens were only delegates, and had nothing but a limited power of acting; and that Jehovah had reserved to himself the rule in the kingdoms of men; and of which, in despite of their god, the heavens, he would make them sensible. It was saying by actions, what Jehovah said to Nebuchadnezzar in words, *Thou shalt know*, דִּי שְׁלֹטֹן שָׁמַיָּא, *that the heavens are my deputies*. It was making their deities stand as idle spectators
(perhaps

(perhaps in the very places sacred to each of them) of their votaries total defeat, and enemies triumph over them; who were so little able to vindicate their own honour, or assist their worshippers, that they were made even to fight against those they were bound to protect. Where then was the cruelty to destroy these rebels to God, and his Christ, any more than to destroy rebels to a prince or government, or violators of the laws of society? We do the one to keep people in their allegiance to a temporal prince, and in their duty to one another, for the better security of our temporal good and welfare. If the other is as necessary to secure their allegiance to the King of kings, and their eternal good and welfare, is it not of as much higher consequence and concern, as our eternal exceeds our temporal welfare? And did we think the one as interesting as the other, the man and his writings who would seduce us to deny our Saviour and Redeemer, would meet with the same fate as he who denies the right and title of the temporal prince?

CHAP.

C H A P. V.

*Of light and its properties, as laid down by
Sir Isaac Newton in his Optics.*

“**L**IGHT,” says a celebrated Newtonian, “of all bodies is that which most explains the secrets, and brings us the nearest to the first springs of nature.” And as “it has been traced in its motions and effects; has even been anatomized, and separated into all its possible parts,” (to use the same author’s words) by Sir Isaac Newton; it may be worth the while to take a view of his doctrine of light and colours, and see what we may find there, either to confirm or disprove the Mosaic philosophy. For, doubtless, that great man was happily accurate in making his experiments, though I presume to think him mistaken in his reasonings from them: and if I can thence produce any thing in proof or favour of what I have advanced, it may, perhaps, be a means to persuade people into a better opinion of Mr. Hutchinson, and his philosophical tenets.

He

He observes of colours, that they are inherent in the rays of the sun themselves; that is, the same rays constantly excite the sensation of the same colour, as the red-making rays always excite the sensation of red; the violet-making rays, the sensation of violet; and so of the other intermediate ones; and that they will never by any means change their colour, nor separate into other rays; to contain such a colour being their essence, and nothing can alter them; for by the experiment of the prism, light falling upon it, is split into seven principal rays, each of which carries in itself a primitive or primordial colour peculiar to itself; from that mixture of the seven rays come all the colours in nature; and the whole seven united, and reflected together from one object, form whiteness. Now, this is not peculiar to the light from the sun; but light from a candle, fire, or lighted paper, refracted by a prism, gives the same seven colours: from whence the following inferences naturally flow. That light as to substance is the same, (since it has the same effects), whether it comes from the sun, a culinary fire, candle, or &c. Air is the *sine qua non*, without which neither a culinary fire, or candle, or &c. will burn; and therefore is the substance or essence of fire and light. And as, according to
Newton's

Newton's own rule of philosophising, similar effects must have similar causes, as light in a culinary fire and in the sun; thence air, such as supports our culinary fire, supports the fire at the sun; if so, the air must be melted, split, or ground by the action of fire, and pressed out in light: For it is not the fuel which affects us, as light and heat: it, as we see, is dissolved, and left as a *caput mortuum*, except what is carried away in smoke, and is only a proper medium for the fire to act in. What then is it that comes out in light and heat, but that which went in, *viz.* the air? But its parts, by attrition, are split, attenuated, and divided so small, as to affect the eye as light, and the hand as heat. Hence we may get another step, that the orb of the sun does not every moment send out part of his own substance, (to support which was forged the infinite divisibility of matter), but that the gross air or spirit is there ground into light, and pressed out by succeeding spirit; and consequently, that as light is every instant sent out, gross air must every instant go in, to make a constant flux and reflux of this one substance in its two conditions, of light, and air or spirit. And this again leads us to this conclusion, that to effect this, all must be full, and this system must be bounded.

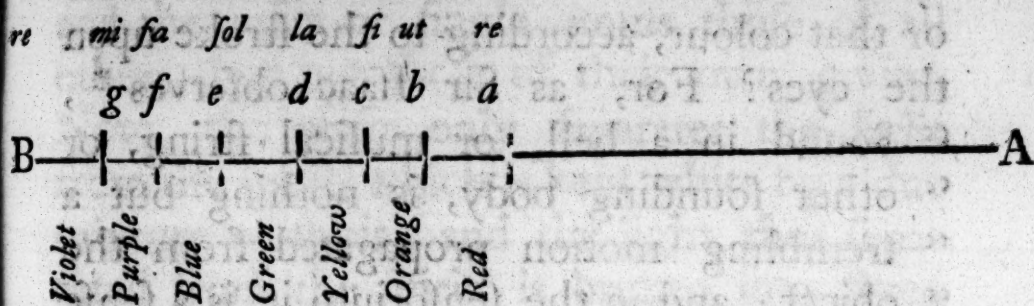
Sir

Sir Isaac Newton next observes, that lights that differ in colour, differ also in degrees of refrangibility; and that of the seven principal rays which form the seven principal colours, each ray hath its proper colour answering to its degree of refrangibility; and that the seven rays are so refracted, as to have the same proportion to each other as the seven notes in music*.

It is found, that sounds are in a reciprocal duplicate proportion of the weights which form them. Thus, for instance, if a hammer of one pound weight strike any note, an hammer of four pound weight will strike an octave to it: so if a string, stretched with one pound weight, yield a given note, stretched with a weight of four pounds, it will yield an octave; or, which is the same thing, the same weight with which a string sounds any note, applied to half the length of the string will sound an octave; and so of the other notes, the weights being reciprocally as the squares of

* As all the variety of music arises from seven notes or sounds, and all the variety of colours from seven; so the number seven comprehends all that is agreeable to the eyes or ears, and completes the harmony of sight and sound. So in the Hebrew tongue, שבע, is *seven*, and *fullness* and *completion*.

the distances. Let the line AB* be stretch-



ed and founded, and the same weight which at *a*, its middle, founds the octave to it, *alamire*, for instance, will at *b* found *ut*, the note above it, at *c* *fi*, at *d* *la*, at *e* *sol*, at *f* *fa*, at *g* *mi*. Now these proportions are exactly the same as those of the seven colours; the same divisions which mark the one marking the other. Gross air or spirit is the medium of sound; and light or fine ether is the medium of vision: for we can see through an exhausted receiver in which a bell will not sound. When a string of a musical instrument is struck, what does this do, but put the air around, and perhaps in it, in motion; *that*, the air next adjoining; and so on, till *that* next it strike the ear; and the sound will be grave or acute, loud or soft, according to the stroke upon the ear? Is not vision performed in the same manner? does not the light from the object put the continuous line of particles into

* For an exact delineation, see Fig. 17.

motion,

motion, and so push those next into the
 eyes, and affect them with the sense of this
 or that colour, according to the stroke upon
 the eyes? For, as Sir Isaac observes*,
 “ Sound in a bell, or musical string, or
 “ other sounding body, is nothing but a
 “ trembling motion propagated from the
 “ object; and in the sensorium it is a sense
 “ of that motion under the form of sound.
 “ So colours in the object are nothing but
 “ a disposition to reflect this or that sort of
 “ rays more copiously than the rest; in the
 “ rays they are nothing but their disposi-
 “ tions to propagate this or that motion in-
 “ to the sensorium, and in the sensorium
 “ they are sensations of those motions un-
 “ der the forms of colours.” They own
 that the air is not all of the same subtilty:
 and, according to Mr. H. it is a mixture of
 light and spirit, which are the same as to
 substance, but differ in the size of their con-
 stituent parts; the light consisting mostly of
 atoms, or small massulæ; the spirit of grains,
 formed of those atoms; some grains of more
 atoms, some of less, so larger and smaller,
 from those which will not pass the pores of
 glass, to several degrees smaller; as tens,
 nines, eights, &c. till those of single atoms;
 of which grains some will not pass the pores
 of some sort of solids, some pass the pores

* Optics, p. 109. edit. 1721.

of one sort, others of other solids or fluids, and the units or single atoms those of all others, but not those of their own grains. Now, the prism only separates the light from the spirit, which is kept white by a due mixture of spirit; and the light, thus separated from the spirit, is broken into seven different rays, differently refracted, and which give the sense of different colours, according to their different degrees of refrangibility; the least refracted ray giving red, or fire, the strongest colour; the most refracted, violet, which is the weakest colour. Now, the different degrees of refrangibility shew, that they must strike the eye with strokes of different force; and their resemblance and agreement with the seven notes in music shew, that the seven colours are impressed upon the sensation by the different strokes of the finer parts of this fluid upon the eye, as the seven notes by the different strokes of the grosser upon the ear. Sir Isaac's 13th and 14th queries are very much to the purpose. *Optics*, p. 320. Q. " Do
 " not several sorts of rays make vibrations
 " of several bignesses, which according to
 " their bignesses excite sensations of several
 " colours, much after the manner that the
 " vibrations of the air, according to their
 " several bignesses, excite sensations of several
 " sounds? And, particularly, do not
 " the most refrangible rays excite the short-

Q

" est

“ est vibrations, for making a sensation of
 “ violet; the least refrangible, the largest,
 “ for making a sensation of deep red; and
 “ the several intermediate sorts of rays, vi-
 “ brations of several intermediate bignesses,
 “ to make sensations of the several interme-
 “ diate colours?

“ May not the harmony and discord of
 “ colours arise from the proportions of the
 “ vibrations propagated through the fibres
 “ of the optic nerves into the brain, as the
 “ harmony and discord of sounds arise from
 “ the proportions of the vibrations of the
 “ air? for some colours, if they be viewed
 “ together, are agreeable to one another,
 “ as those of gold and indigo, and others
 “ disagree *?”

So again, *Query* 29. “ Nothing is more
 “ requisite for producing all the variety of

* Dr. Clarke, in his Latin edition of the *Optics*, has worded the latter part of this query in such a manner as, in my opinion, to alter the author's sense.—*Sunt, enim, alii colores, (says the Doctor), si juxta se invicem positi simul inspiciantur, oculis grati, ut auri et indici; alii autem minus grati. i. e.* “ There are some colours, which, if they are
 “ viewed together, are agreeable to the eyes or sight, and
 “ others less agreeable.” Which does not, I think, come up to Sir Isaac's meaning; which is, that some colours, as gold and indigo, are concords to one another, as thirds, fifths, and eighths, in music; and others discords, as seconds, fourths, and sevenths. If the Latin can be said to imply this meaning, it does not clearly express it.

“ colours

“ colours and degrees of refrangibility, than
 “ that the rays of light be bodies of diffe-
 “ rent fizes, the least of which may make
 “ violet the weakest and darkest of the co-
 “ lours, and be more easily diverted by re-
 “ fracting surfaces from the right course;
 “ and the rest, as they are bigger and big-
 “ ger, may make the stronger and more
 “ lucid colours, blue, green, yellow, red,
 “ and be more and more difficultly diver-
 “ ted.”

Thus far I have the satisfaction to go
 along with the great oracle of our nation;
 and may venture to conclude, if you will
 allow the expression, that we feel sounds
 and colours, or that hearing and seeing is
 performed by impulse §; whence I would
 infer the necessity of a plenitude of matter,
 and that the one substance of the air, in its
 three conditions, of fire, light, and spirit, at
 least of light and spirit, is every where, be-
 cause we can hear and see every where.

A lighted candle may be seen at the dis-
 tance of twenty miles, so will enlighten eve-
 ry part of a sphere of forty miles diameter.

§ The person born blind, of about fourteen years old,
 couched and cured by Mr. Cheselden, 1729, is a proof of
 this. Every thing he saw seemed at first to be upon his
 eyes, and to touch them, as the objects of the sense of feel-
 ing touch the skin.

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 eyes, and to touch them, as the objects of the fenfe of feel-
 ing touch the fkin.

Now how could this be, if all was not full of an aerial medium, whose parts are contiguous and continuous every way? The candle cannot send out parts of itself to fill such a space in an instant; the tallow only serves to moisten the wick, and make it fitter for the action of fire to be supported in it; its proper supply is the air, without which it will not burn, and which is sent out melted in light. But how does this light affect the eyes of a multitude, by whom it is seen at once from all parts of the sphere? The atoms pressed out from the candle move those which are next, and so successively in a strait line to each eye, instantaneously, or in the same moment of time that the first atom moves the distance of its own dimension from the candle; so it is seen by each person at the same time. And this is no proof of the infinite divisibility of matter, but of a plenum. For there is air in every part of the sphere, because a candle will burn in every part; and it must come in on every side, in every direction, to supply the flame; and so light must come out on every side, in every direction, and so impel the lines of ether which reach from the candle to each person's eyes. So the object is felt by the lines of ether, as any thing is felt by a stick held in the hand. Thus, if we argue from similar effects to similar causes, the vast sphere which the sun

sun enlightens, must be full of light and spirit: the one must be pressed in, to supply the fire; the other pressed out, to enlighten, warm, cherish, and give life, &c. to the earth, its products and inhabitants: and this cannot be effected, unless this system be full and bounded.

None need be surprized that the fine particles of this fluid should be so easily moved in light, when they consider how easily the grosser parts are moved in sound; nor need they doubt of vision being performed by the motion and impulse of the intermediate particles between the object and the eye, when hearing is manifestly performed in the same manner, by the motion and impulse of the spirit or grains of air; for common air, and not a subtil fluid, is allowed to be the medium of sound. The report of a cannon is heard several miles: but it could not be heard through a vacuum; and so there must be air between *quaquaversum*. The air is rarefied by the firing of the powder, into which the gross air immediately rushes, and so makes the explosion or report, by putting the air around into that undulating motion that causes sound. The air that makes the report cannot strike the ear, from which it may be many miles distant; but the stroke upon the ear must be made by the air contiguous to the ear being

pushed against it, by the air next adjoining; the undulating motion that causes sound being given to the circumjacent air, by the gross air or spirit rushing into the vacuum, or air rarefied by the fire. Seeing the fire before the sound is heard, is no proof that sound is not instantaneous, or that light moves faster than sound: for the stroke upon the sight is made by the line of ethereal particles pushed against the eye upon firing of the powder; and the stroke upon the ear, by the air or spirit rushing with violence into the vacuum made by that firing, and thereby pushing a stream of air or spirit against the ear. So when any body is struck, for the same reason, we see the stroke before we hear the sound; and therefore the argument for a vacuum drawn from hence is null. And if sound be instantaneous, then there must be a plenum by their own confession; for they allow, that if there were a plenum, sound would be heard immediately. If it be objected to this account, That there is no sound when powder is fired loose; let the objector consider, that the same reason that makes powder confined in the barrel of a gun, or &c. when fired, capable of doing such execution, and when fired loose of doing little or none, will serve to explain why it gives such a report when confined, and makes so little or no noise when fired loose. In the one case there is
nothing

nothing solid to rebound from till at that distance that its force is spent; in the other there is the gun-barrel. Besides, powder fired loose, cannot drive away the air with that force or velocity, nor to that distance, as when confined. Thus, a smart quick motion of a stick or whip will make a crack, when a slower motion will give none. So in the stentorophonic tube, the sound by going out with greater force, is capable of being heard louder and farther.

There is another resemblance between sounds and colours, which is, that the most distant rays, the violet and the red, strike our eyes at the same time; and that the most distant sounds, the gravest and the sharpest, come also to our ears with equal velocity. This again shews, that hearing and seeing have the same efficient cause, and that this cause is the impulse of the air. For if the descent of a guinea and feather, with the same velocity, *in vacuo*, be a proof of their being impelled or made to descend by the same agent, and in the same manner; then the blue rays being impressed upon our eyes as soon as the red, and the note *re* being impressed upon our ears as soon as the note *ut*, will prove, that the same agent is the cause of seeing and hearing, and that they are performed in the same manner, namely, by impulse. For

since hearing is confessed to be owing to the action of the air, and to be performed by impulse; since light and sound have such an affinity, and the theory of light has something in common with the theory of gravitation; what hinders us to conclude, that one and the same agent is the cause of these effects, and that this agent is the air? What confounded our great men, was their ignorance of its two conditions of light and spirit; the one being fitted to act on the outer surfaces of bodies, which they alone called air; the other on the internal parts, or constituent atoms, which was sometimes called an ethereal medium, and sometimes nothing.

The proof that light is not instantaneous, drawn from the eclipses of Jupiter's satellites not being seen to happen at the time for which they are calculated, is paying too great a compliment to the exactness of their tables, to pass for demonstrative evidence with any impartial person.

Upon this supposition they tell us, that light is six months in coming to us from the nearest fixed stars, six years and above a month from others, and thirty-six years and a half from stars of the sixth magnitude: though I must do them the justice, that they own, that "this calculation is
" founded

“founded upon experiments very delicate,
 “and at the same time very imperfect.”
 This hypothesis is Huygens’s and Hart-
 soeker’s; but Sir Isaac has adopted it, and
 made it current by his sanction. According
 to this theory, the first man was five
 months and three weeks before he saw one
 star, and thirty-six years before he saw
 them all; which would make him imagine
 that they were a new creation: and an
 astronomer, while he is gravely observing
 the face of the heavens, sees not the state
 of the stars as they actually are at that time,
 but as they were six months, six years,
 twelve years, eighteen, twenty, thirty, and
 thirty-six years ago; so always sees them
 where they are not, above the horizon,
 when they are actually under it: nay,
 while he is exposing his body to the incle-
 mency of the nightly dews for the sake
 of his fellow-creatures, what he sees may be
 all phantom and delusion; and, for ought
 he knows to the contrary, the stars may be
 all annihilated and extinct; and after rack-
 ing his eyes and brain with observations and
 calculations, he never can at any one time
 be certain that the stars actually and really
 exist; but may always be mocked with false
 images and vain illusions. Our philoso-
 phers, when they talk or write about these
 bodies, ought to use the language in which
 we speak of persons in distant countries,
They

They were living, and at such a place when we heard last from them. But it does not clearly appear how we can by this means see the stars at all times as we do; for when we see them, the light that comes then to the eye, and represents those stars to us, is not that which at that time is sent from them, but that which was sent six months or *&c.* ago. Does this light stay upon the eye, till the other comes express from the stars to us? or how is it done? I fancy we shall want some new mathematical principles to account for it. If light be lines reaching from the luminous body to the body illuminated, and to our eyes; then the moment the first atom moves its own dimension from the body, the last will strike our eye; so be instantaneous. *Sed pudet nugis diutius immorari.*

Ignorance of what light is, how it is formed, and how it acts, has drawn these great men into these, and many more absurdities: and it is a pleasure to see, that, after all their experiments, and strenuous joint endeavours to maintain a vacuum, and to impose upon us words for agents, they are forced to own, not only the existence, but the agency of a subtile fluid, or a medium of different degrees of subtilty, *quaquaversum*, and acting *quaquaversum*.

The

The learned Boerhaave, after a life spent in experiments, found the result to be this, that fire is always present in every place, and in every body; and that its action is excited by attrition.

Now, the air, in its conditions of light and spirit, is actually every where, and in every body; and the action of fire consists in air in agitation and attrition, which grinds it, and sends it out in light and heat. But it is evident, that this author could only mean, that this aerial fluid was every where within and without bodies, and was at all times capable of being, by attrition, put into the action of fire; and not that the action of fire was in every place, and in every body.

The great Sir Isaac Newton, although his whole scheme is built upon a vacuum, and matter acting by certain properties, without the agency of a fluid; after the most diligent and accurate enquiries, made in his maturer years, when his judgment was ripened by age and experience, evidently saw the necessity of, and has as honestly owned the agency of an omnipresent and omnipotent subtil spirit or ether, which he puts not only in his little, but his great vacuum, and makes the catholic agent of
all

all the phenomena of nature. Let us hear his own words.

“ The gravitating power of the sun is
“ transmitted through the vast bodies of the
“ planets without any diminution, so as to
“ act upon all their parts to their very centres, with the same force, and according
“ to the same laws, as if the part upon
“ which it acts were not surrounded with
“ the body of the planet.” This gravitating power he makes to be lodged in a very subtil spirit diffused through the universe, of different subtilty and density in different parts.
“ It is much rarer within the dense bodies
“ of the sun, stars, planets, and comets,
“ than in the empty celestial spaces between
“ them,” (how spaces full of a fluid can be called empty, I understand not); and in
“ passing from them to great distances, it
“ grows denser and denser perpetually, and
“ thereby causes the gravity of those great
“ bodies towards one another, and of their
“ parts towards the bodies; every body endeavouring to go” (why did he not here, as he does below, say, *being impelled?*) “ from
“ the denser parts of the medium towards
“ the rarer. For if this medium be rarer
“ within the sun’s body than at its surface,
“ and rarer there than at the hundredth
“ part of an inch from its body, and rarer
“ there

“ there than at the fiftieth part of an inch
 “ from its body, and rarer there than at the
 “ orb of Saturn ; I see no reason” (says Sir
 Isaac Newton) “ why the increase of density
 “ should stop any where, and not rather be
 “ continued through all distances from the
 “ sun to Saturn, and beyond. And though
 “ this increase of density may, at great dis-
 “ tances, be exceeding slow ; yet, if the
 “ elastic force of this medium be exceeding
 “ great, it may suffice to *impel* bodies from
 “ the denser parts of the medium towards
 “ the rarer, with all that power which we
 “ call *gravity*.” So *gravity* is now *impulse*,
 and motion is in a plenum : for surely such
 a fluid medium is a plenum to all intents and
 purposes, and must be present to every thing
 essentially and substantially : its presence ma-
 nifests itself by its operation, but it could not
 operate if it was not there. But lest this
 should seem inconsistent with the planets
 moving in spaces free from resistance and
 matter, he would reconcile these contra-
 dictions in his twenty-second query. “ May
 “ not planets and comets, and all gross bo-
 “ dies, perform their motions more freely,
 “ and with less resistance, in this ethereal
 “ medium, than in any fluid, which fills all
 “ space adequately, without leaving any
 “ pores ; and by consequence is much den-
 “ ser than *quicksilver* or *gold* ? And may not
 “ its

“ its resistance be so small as to be inconfi-
 “ derable, scarce to make any sensible alte-
 “ ration in the motions of the planets in
 “ ten thousand years ?” But the mecha-
 nism of the heavens is so contrived, that the
 fluid of the air can never become as dense as
 gold or quicksilver, except at the circumfe-
 rence of this system, where it is condensed
 to the highest degree ; and has, by way of
 eminence, the name of *ay*, *GNaB*, the *den-*
sity ; because it is necessary that the air should
 be in that condition there, (as it is rarest or
 finest at the centre), in order to support and
 carry on the œconomical operations of the
 whole, and all its parts : for it is the whole
 business of the macrocosm to prevent a con-
 densation. Is there any part of the heavens
 fuller than ordinary of the grains, or large
 masses of the spirit ? thither the atoms or
 small massulæ of light immediately are de-
 tached, to mix among, expand, and rarefy
 them. Is there any place where the atoms
 of light, or finer particles of the heavens,
 more than ordinary abound ? thither rush
 in the grains of spirit, to prevent a coalition
 of the parts, and to expand them. Thus
 the heavens are in a continual state of war-
 fare ; nor is there peace any where, but in
 the high places, as Job says ; that is, at the
 extremity of this system. If any solid in-
 tervenes, as the earth, for instance ; the
 light and spirit, by endeavouring to mix,
 compress

compress it on all sides, and cause, as before observed, the gravity of bodies towards it. And thus the resistance which this medium of the air may be supposed to give to the orbs moving in it, is of no consideration, if (as I have endeavoured to prove) the uniform accelerative force with which it impels them, is sufficient to overcome it, and to continue them in motion. This same mechanism of the heavens is the cause of what they call the elasticity of the air: for the finer parts rushing in amongst the grosser, and the grosser amongst the finer, to keep up an equilibrium, as the aerial medium is in any place finer or grosser; the fluid in that place by this means will occupy more room in proportion to the quantity of adventitious particles: which the Newtonians attribute to the particles themselves setting their arms a-kembo, and keeping each other at a distance. Thus a bladder, with a small quantity of air in it, tied close, and sealed, so that the air cannot escape, when placed in the open air, is kept flaccid by the pressure of the outward air; but place it in the receiver of the air-pump, and as fast as the gross air is drawn out, the finer comes in through the pores of the glass, and entering through the pores of the bladder, blows it up: for the extraction of the gross air makes a draught of the finer, whereas in the open air there is none. And when the gross air
is

is let in again, its pressure squeezes out the finer air, and makes the bladder return to its former shape and flaccidness. So, if the bladder be placed before a fire, the finer parts of the air, made so by the action of the fire, are pressed out from the fire by the draught of gross air into the fire, and enter the pores of the bladder, and by degrees make it swell, and become turgid: and I think, if the pores of the bladder could be stopped, by immersion into any proper fluid, so that the finer parts of the air could not enter, it would remain flaccid in the receiver, notwithstanding the extraction of the air, and the pretended expansion and elasticity of that within it. But to return to his questions.

Query 18. “Is not this medium exceedingly more rare and subtil than the air,
 “and exceedingly more elastic and active?
 “and doth it not readily pervade all bodies?
 “and is it not [by its elastic force] expanded
 “through all the heavens?”

Query 19. “Doth not the refraction of
 “light proceed from the different density
 “of this ethereal medium in different places,
 “the light receding always from the
 “denser parts of the medium? and is not
 “the density thereof greater in free and
 “open spaces, void of air and other grosser
 “bodies,

“ bodies, than within the pores of water,
 “ glass, crystal, gems, and other compact
 “ bodies?” [they are framed so as only to
 admit the light, or finer parts of the air]:
 “ for when light passes through glass or
 “ crystal, and falling very obliquely upon
 “ the farther surface thereof, is totally re-
 “ flected, the total reflection ought to pro-
 “ ceed rather from the density and vigour
 “ of the medium without and beyond the
 “ glass, than from the rarity and weakness
 “ thereof.” The reflection, I suppose, pro-
 ceeds from the gross air or spirit, which
 cannot pass the pores, and so presses on the
 surface; to which the obliquity of the angle
 and disposition of the pores may contri-
 bute.

Query 20. “ Doth not this ethereal me-
 “ dium, in passing out of water, glass, cry-
 “ stal, and other compact and dense bodies,
 “ into *empty spaces*, [full of dense ether, as
 “ in question 19.], grow denser and denser
 “ by degrees, and by that means refract the
 “ rays of light, not in a point, but by
 “ bending them gradually in curve lines?
 “ And doth not the gradual condensation
 “ of this medium extend to some distance
 “ from the bodies, and thereby cause the
 “ inflections of the rays of light, which
 “ pass by the edges of dense bodies at some
 “ distance from the bodies?”

R

Here

Here is an acknowledgment of air and ether, or of ether in two conditions, namely, dense and rare, diffused throughout the universe, which serves to impel bodies from the denser parts of this medium towards the rarer, with all that power which we call *gravity*; and that this medium in its condition of *rare*, is much subtiler than air, and remains in the vacuum after the air is drawn out. Mr. H. says, that the medium of the heavens is alternately put into a denser and rarer condition; that the light continually pressed out from the sun, is the rare moiety of the heavens, and the spirit, or grains of air, continually pressed in from the circumference to the sun, is the denser moiety of the heavens; and that the denser parts of this medium, which must always lie on the hemisphere of the planets turned from the sun, as the rarer upon the hemisphere next it, impel those bodies from the denser, towards the rarer parts of this medium, that is, towards the sun, with all that force which is called *gravity*; and that it is the *light* that remains in the receiver after the air is drawn out. Where is the mighty difference between the accounts of these two great men, (if I may without offence call Mr. H. by that name), that the one should not only be received with approbation

at

at first, but adopted now, by his admirers and defenders, in order to free him from the confessed absurdity of making gravity an essential property of matter; and that the other should be treated with such supercilious contempt? Sir Isaac himself proposed this account of an ethereal medium as the cause of gravity; and Dr. Clarke, in a letter to Mr. Leibnitz, promises, in the name of the learned, that if he, or any other philosopher, can by the laws of mechanism explain the phenomena of attraction and gravitation, he would not only not be contradicted, but would, moreover, have the abundant thanks of the learned world. And why an attempt towards this, had Mr. H. failed in the execution, should not meet with a candid reception, is a question the learned would do well to take into consideration.

We have more concessions in the following questions.

Query 23. “ Is not vision performed
 “ chiefly by the vibrations of this medium,
 “ excited in the bottom of the eye by the
 “ rays of light, and propagated through
 “ the solid, pellucid, and uniform capilla-
 “ menta of the optic nerves into the place
 “ of sensation? And is not hearing per-
 “ formed by the vibrations either of this,

“ or *some other* medium, excited in the au-
 “ ditory nerves by the tremors of the air,
 “ and propagated through the solid, and
 “ pellucid, and uniform capillamenta of
 “ those nerves, into the place of sensation?
 “ and so of the other senses.”

Query 24. “ Is not animal motion per-
 “ formed by the vibrations of this medium
 “ excited in the brain by the power of the
 “ will, and propagated from thence through
 “ the solid, pellucid, and uniform capilla-
 “ menta of the nerves, into the muscles,
 “ for contracting and dilating them? I sup-
 “ pose, that the capillamenta of the nerves
 “ are each of them solid and uniform; that
 “ the vibrating motion of the ethereal me-
 “ dium may be propagated along them
 “ from one end to the other, uniformly
 “ and without interruption; for obstruc-
 “ tions in the nerves create palsies.”

Here we see nothing can be done without
 this medium in its two conditions of dense
 and rare ether; and yet, in Query 28. p.
 339. he can neither do without them, or
 conceive how they can exist. These are
 his words. “ And it is as difficult to ex-
 “ plain, by these hypotheses,” [meaning
 those mentioned in the former part of the
 question], “ how rays can be alternately in
 “ fits of easy reflection, and easy transmis-
 “ sion,

“ sion, unless perhaps one might suppose
 “ that there are in all space two ethereal
 “ vibrating mediums; and that the vibra-
 “ tions of one of them constitute light,
 “ and the vibrations of the other are swifter,
 “ and as often as they overtake the vibrati-
 “ ons of the first, put them into those fits.
 “ But how two ethers can be diffused
 “ through all space, one of which acts up-
 “ on the other, and by consequence is re-
 “ acted upon, without retarding, shattering,
 “ dispersing, and confounding one another’s
 “ motions, is inconceivable.”

The vibrative motions of the light and spirit, the one inward from circumference to the sun, the centre, the other outward from the centre to circumference, are so far from retarding, shattering, and confounding each other, that they support themselves and every thing else in this system, in their motions, stations, or *&c.* And the heavens have the name of **שחקים**, *the strugglers*; which is expressive of those alternate dartings of the light and spirit backward and forward. And the Heathens, who were worshippers of the host of heaven, instituted *wrestling* in their games as a religious service to this power; not to mention other obscene rites. This vibration is visible through telescopes; and I think it may be called an ocular proof of the existence and circulation of the light

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and spirit. So, in a culinary fire, the spirit
is continually going in, and the light coming
out; and yet these alternate vibrations do
not disperse and confound, but assist each
other; and their mutual endeavours pro-
duce light and heat. But notwithstanding
that this hypothesis of two ethereal vibra-
ting mediums is declared inconceivable, he
has recourse to something very like it. For
he says, *Query* 28. " Nothing more is re-
" quisite for putting the rays of light into
" fits of easy reflection, and easy transmis-
" sion, than that they be small bodies,
" which, by their attractive powers, or
" some other force, stir up vibrations in
" what they act upon," [*i. e.* the ethereal
medium]; " which vibrations being swifter
" than the rays, overtake them successively,
" and agitate them so as by turns to in-
" crease and decrease their velocities, and
" thereby put them into those fits." As
rays of light are bodies, they must com-
pose a fluid medium, the vibrations of
which constitute light, as above; and as
they, or their vibrations, act upon another
ethereal medium, there must be two vi-
brating ethereal mediums diffused through
all space, by his own concession. And his
two accounts, though designed, I suppose,
to be different, are the same. In *Query* 21.
this medium had force to impel bodies,
with all the power called gravity. In *Query*
28. it

28. it has lost it again ; for there we find
 “ the heavens void of all sensible resistance ;
 “ and, by consequence, of all sensible mat-
 “ ter.”

These absurdities, and inconsistencies with himself, proceeded from his seeing more than he was willing to confess ; and his endeavouring to evade the confession of what he evidently saw. He every where plainly saw, that the fluid of the air, in its conditions of light and spirit, by its contrary motions, [which he calls vibrations], acted upon every thing, and performed all the effects he attributed to attraction, and gravity, and properties in matter.—And at the same time he must see, that this was destructive of his whole principles of natural philosophy ; so would gladly shuffle off and confound what his experiments forced him to see, and of what they extorted an awkward confession.—If his ethereal medium fills the heavens, it is by its expansive force ; that is, according to him, by not filling it ;—the exhausted receiver is full of this medium, and yet empty space ;—and the planets move in empty spaces, full of an ethereal medium. So to say, the heavens are full of emptiness, is not unphilosophical, however it may be nonsense. And he talks of fits, inclinations, and dispositions, in the rays of light, &c. as if they could

could move of themselves ; and though he allows the sun to be supplied, as culinary fires, with air, it must be only in an atmosphere. In his last question he gives up his *Principia* by wholesale : for he says,

“ Seeing therefore the variety of motion
 “ which we find in the world, is always
 “ decreasing, there is a necessity of con-
 “ serving and recruiting it by *active princi-*
 “ *ples*, such as are the *cause* of gravity, by
 “ which planets and comets keep their mo-
 “ tions in their orbs, and bodies acquire
 “ great motion in falling ; and the cause of
 “ fermentation, by which the heart and
 “ blood of animals are kept in perpetual
 “ motion and heat, the inward parts of the
 “ earth are constantly warmed, and in some
 “ places grow very hot, bodies burn and
 “ shine, mountains take fire, the caverns
 “ of the earth are blown up, and the sun
 “ continues violently hot and lucid, and
 “ warms all things by his light. For we
 “ meet with very little motion in the world,
 “ besides what is owing to these *active prin-*
 “ *ciples*. And if it were not for these prin-
 “ ciples, the bodies of the earth, planets,
 “ comets, sun, and all things in them,
 “ would grow cold, and freeze, and become
 “ inactive masses ; and all putrefaction, gene-
 “ ration, vegetation, and life, would cease,
 “ and the planets and comets would not re-
 “ main

“main in their orbs.” And in another part of this question, he has these remarkable words.—“The *vis inertiae* is a
 “passive principle by which bodies persist
 “in motion or rest, receive motion in proportion to the force impressing it, and resist as much as they are resisted. By this
 “principle alone, there never could have
 “been any motion in the world. Some
 “other principle was necessary for putting
 “bodies into motion; *and now they are in*
 “*motion*, some other principle is necessary
 “for conserving the motion.”——If this is not an acknowledgment of the insufficiency of his own principles, and the necessity of the constant regular action of matter upon matter, or mechanism in matter, to carry on the œconomical operations of nature in the manner we see they are continued, I know not what is! A vacuum, and the gravity of atoms, are the principles of his philosophy; the first he here fills with his ethereal medium, and the other requires active principles to set it on foot, and keep it going. Is not that very like a plenum, and this as like mechanism?——In short, his many doubts and uncertainties about his own principles;——his owning attraction may be performed by impulse;——that the atoms of matter are *impenetrable* and *indivisible*, which destroys the account of the infinite divisibility of matter;——his having
 recourse

recourse to a subtil spirit, an ethereal medium, or active principles, such as are the cause of gravity, to which all the motion in the world is owing, manifestly prove that he was not satisfied and content with his principles or laws of motion, but was convinced that motion was not owing to properties in matter, whether inherent or superadded, and that it could neither be preserved nor continued without mechanism in matter. And his last defender, Mr. Maclaurin, acquaints us, that it was his opinion early, that an ethereal medium was the physical cause of the phenomena of nature ; but that he was not able to give a satisfactory account of the manner of its operation in producing the phenomena.—Mr. Hutchinson, who never aspired higher than to be a disciple of Moses, nor to make a greater progress in the knowledge of nature, than to understand his writings, has from thence [pardon me, courteous reader] supplied this defect, and has laid down the Mosaic or scripture principia in such a manner, as will explain the agency of nature, as she herself acts, in the shortest and simplest manner ; and inform us how the heavens declare the glory of God, and the firmament sheweth his handy-work.

C H A P. VI.

Of the alliance between philosophy and theology.

I Come now to shew the use and design of philosophy; which is, to exhibit ideas of what we could not otherwise come at, *viz. the mode of existence, and manner of acting of the persons in Jehovah*; which will prove, to demonstration, the *fundamental* point of Christianity; I mean the *Trinity*, of which philosophers have so often called upon us for ideas, and of which they have so industriously laboured to destroy the evidence, by emptying the heavens of that fluid which is the glass that reflects it to us.

The religion of nature has of late been propagated among us with more than ordinary diligence and success; and the Christian faith has been unhappily, and I hope undesignedly, betrayed into the hands of the infidel, by that fatal concession, that *Christianity presupposes the truth of natural religion*.——Natural religion supposes, that man of himself is able to know, and do his duty. And every one may see, that if man,
by

by his own unassisted natural abilities, is of himself sufficient to discover what is to be done, and to do what will work out his salvation, there can be no necessity for a revelation from God, nor a Redeemer. And with what consistency can any one preach up, that our sufficiency is of God, when he admits, upon the principles of natural religion, that it is of ourselves?—But yet, with all the rich materials of which the Deist makes his boast, *the moral sense, the inward feeling, and the voice of God speaking within us*, to discover the principles of morality, and of natural religion, we are far from having a compleat system of either, as is confessed by our moral writers themselves. The very foundations of morality which are laid by one writer, are dug up by another. Every author exhibits a system of morals, such as best suits his taste and fancy:—“This exalting man to an angelic nature, and composing laws for his conduct far above the reach of his humanity; that degrading him to a level with the brutes that perish.”—“Lord Shaftesbury, to whom the world is so much indebted for his inestimable writings,” (says a late author), “has not proved virtue to be our duty, in so clear and convincing a manner as the subject requires, in order to form a compleat system of morals.—Mr. Wollaston gives us

“ us only a whimsical system of morals.—
 “ Mr. Hutcheson’s account of morality is
 “ imperfect.—Dr. Clarke’s fitness and un-
 “ fitness of things, and his demonstration
 “ of the existence and attributes of the
 “ Deity *a priori*, afford no solid and per-
 “ manent conviction.—Bishop Butler, a
 “ manly and acute writer, though he has
 “ gone farther than any other to assign a
 “ just foundation for moral duty, has not
 “ said enough to afford that light which
 “ the subject is capable of. And those who
 “ make morality depend upon the will
 “ of God, do not advance us a single step
 “ in the knowledge of our duty. For
 “ what does it avail to know, that mora-
 “ lity depends upon the will of God, till
 “ we once know what his will is? and how
 “ can we know his will, unless he is plea-
 “ sed to make some revelation or other of
 “ it ?”—And the author, who has lately
 published his moral system to supply former
 defects, may, by some future writer, be
 thought to have done as little toward that
 end as those whom he censures.—But as
 it is allowed, that we cannot know the will
 of God, unless he is pleased to make some
 revelation or other of it, the controversy
 between natural religion and Christianity
 will turn upon this point, namely, By
 which way God has made this revelation,
 by an inward light, or a written record?
 And

And if revelation affords us this knowledge, we have no need to light the rush-light of reason to seek for it elsewhere.

When the senses have acted upon any material natural object, what they take in and retain by that action, is the inward sense or idea of the thing; and the knowledge we gain by such repeated acts of the senses upon nature and her operations, is natural knowledge, or *physics*. When we make use of these natural and acquired ideas to help us to ideas of spiritual things, the knowledge we, by these means, gain of God and his operations, is supernatural knowledge, or *metaphysics*: and so by things that are visible, within the reach of our senses, and which we can understand, we are led to the knowledge of things which are invisible, without the reach of our senses, and which we could not otherwise understand. It is agreed, that we have no innate ideas; and that nothing can be in the understanding, but what comes in by the senses. We therefore either can have no ideas of God and spiritual things, or we must take them in by our senses. But our senses cannot act immediately upon spiritual objects, because they are not the objects of our senses; therefore we must have our ideas of spiritual and invisible things, from natural and visible things. But natural and visible things
can

can give us no ideas of spiritual and invisible things, unless they bear some analogy to them, are the *simulacrâ* or images of them. And if they be the images of them, they must have been so created and framed by God the creator, and to this very end, and with this very design: for nothing could be created by infinite wisdom, but with foreknowledge and design. And since we find in the scriptures God and spiritual things represented to us under the ideas and names of visible and sensible things, it is a demonstration in itself, that God framed them to represent himself, and what he preintended to reveal of himself and his ways to mankind.

“ Why should God’s word and works
 “ disagree?” (says an old anonymous writer).
 “ But if the scripture-account of nature is
 “ not philosophically and physically true,
 “ they must then be such different things,
 “ that the one must needs disgrace the other.
 “ I must confess, I am much to seek to
 “ what scripture shall be applied, and for
 “ whom it was written, if not for us, and
 “ for our instruction. For if they that are
 “ whole (as our Saviour testifies) have no
 “ need of a physician, then did God cause
 “ scripture to be written, neither for him-
 “ self, nor for his angels; but it was writ-
 “ ten for those creatures, who, having lost
 “ their

“ their first estate, were since fallen into
“ corruption. Now, then, if scripture was
“ written for us, it concerns us much to
“ know what use to make of it. And this
“ we may gather from the different condi-
“ tions of man before and after his fall.—
“ Before his fall, man was a glorious crea-
“ ture, having received from God immor-
“ tality and perfect knowledge ; but in
“ and after his fall, he exchanged immor-
“ tality for death, and knowledge for ig-
“ norance. Now, as to our redemption
“ from the fall, we may not (in respect of
“ death) expect it in this world, God
“ having decreed, that all men should once
“ die. But for our ignorance, we may,
“ and ought to put it off in this life ; for
“ as much as without the knowledge of
“ God no man can be saved ; for it is both
“ the cause and earnest of our future im-
“ mortality. It remains, then, that our
“ ignorance must be put off in part, even
“ in this life, before we can put off our
“ mortality. And certainly to this end
“ was scripture written, namely, that by
“ it we might attain to the knowledge of
“ God, and return to him from whom we
“ were fallen. And here let me ask, without
“ offence, *How scripture teaches us to know*
“ *God?* Does it only tell us *there is a God,*
“ and leave the rest to our discretion? Does
“ it teach us to know God by his works,
“ or

“ or without his works? If by his works,
 “ then by natural things; for they are his
 “ works, and none other. If without his
 “ works, I desire to know what manner of
 “ teaching that is, for I cannot yet find it.
 “ If they say it is by *inspiration*, I say too,
 “ that God can teach us so, but the scripture
 “ cannot; for certainly scripture never in-
 “ spired any man, though it came itself by
 “ inspiration. But if it be replied, That
 “ God has given man natural abilities, by
 “ which he may know God without the in-
 “ formation of scripture; I answer, To
 “ what end then was scripture wrote? and
 “ why does it pursue that method by which
 “ it proves what it testifies? Moses proves
 “ God by his creation; but then he gives a
 “ formal detail of the creation and forma-
 “ tion, in order that we may understand
 “ that proof. If his account of the crea-
 “ tion and formation be not physically true,
 “ then his proof is false, and he does not
 “ prove God. If man can prove God by
 “ natural reason, then the scripture-proof
 “ is unnecessary, and God acts without an
 “ end; for with such proof the scripture
 “ abounds. God proves himself to Moses
 “ by transmutation of his rod into a ser-
 “ pent, and of the serpent into a rod. And
 “ to the Egyptians he gives more terrible
 “ *demonstrations* of his *power*, and *sove-*
 “ *reignty* in *nature*, by turning their rivers
 S “ into

“ into blood, and the dust of their land
 “ into lice; by a murrian of beasts; by
 “ blains and boils, and the death of their
 “ first-born; by the several plagues of
 “ frogs, locusts, hail, fire, thunder, and
 “ darkness: all which were but great *natural*
 “ *works*, by which he proved his God-
 “ *head*, that he was, as Moses styles him in
 “ the first of *Genesis*, **נראשית אלהים**, EN
 “ **APXH O ΘΕΟΣ**; and as himself
 “ hath said, *And the Egyptians shall know*
 “ *that I am Jehovah, when I stretch forth*
 “ *my hand upon Egypt*. When he reveals
 “ himself to Cyrus, he does it not by a
 “ simple affirmation, that *he is God*; but
 “ he proves himself to be such by the
 “ world that he has made, *Is. xlv. 5. 7. 12.*
 “ Let any man read those majestic and phi-
 “ losophic expostulations between God and
 “ Job; or, in a word, let him read over
 “ both Testaments, and he shall find, if
 “ he reads *attentively*, that scripture, all the
 “ way, makes use of nature; and has in-
 “ deed discovered such natural mysteries, as
 “ are not to be found in any of the philo-
 “ sophers. Nay, nature is so much the
 “ business of scripture, that I can find no-
 “ thing in it, but what concerns nature,
 “ and natural things: for where it men-
 “ tions regeneration, illumination, and
 “ grace, or any other spiritual gift, it ap-
 “ peals to nature. So that it is absurd to
 “ separate

“ separate scripture and nature, without
 “ which scripture cannot be thoroughly
 “ understood. And God in scripture has
 “ given us a character of nature in all
 “ points, whether we look to the past,
 “ present, or future complexion of the
 “ world. To be short, experience, and
 “ reason grounded thereupon, have taught
 “ me, that philosophy and divinity are but
 “ one and the same science: but man has
 “ dealt with knowledge, as he does with
 “ rivers and wells, which, being drawn in-
 “ to several pipes, are made to run several
 “ ways, and by this accident come at last
 “ to have several names.”

If we consider the heavens, the work of
 God's hands, their immensity, workmanship,
 and operations, we may well cry out with
 Cicero from Plato, *Neceſſe hunc, quem cerni-*
mus, mundum ſimulacrum æternum eſſe alicujus
æterni : “ The material heavens which we
 “ ſee, muſt needs be a type of the immate-
 “ rial, or Deity, which we cannot ſee.”
 This indeed is the ſpeculum or glaſs through
 which we now ſee God, *εν αινιγματι* *, *in*

S 2

or

* Our great Milton has a ſimilar thought.

And what ſurmounts the reach
 Of human ſenſe, I ſhall delineate ſo,
 By likening ſpiritual to corporeal forms,
 As may expreſs them beſt : though what if earth

Be

or *by an emblem*, at St. Paul beautifully, from the known type, expresses it *. And this, in truth, is *speculative* knowledge, where, *velut in speculo*, we see the uncreated tri-une essence, *εν αινιγματι*; because the created substance of the air or heavens, in its three-fold agency of fire, light, and spirit, is the enigma of the one essence, or one Jehovah in three persons.

In the Hebrew of the Old Testament, the heavens have the apellation of שמים, *shemim*, the names, plural. The singular שם, *shem*, is name, used by the Jews in their prayers, &c. for God, as is also the plural *shemim*. So in the New Testament, *The baptism of John, is it from heaven or of men?* And in 1 Mac. iii. 18. *Non est differentia in conspectu cæli, [i. e. coram Deo], salvare in multis vel in paucis.* So שם שמים הכל, *Every thing to the name of heaven, i. e. God.* השמים, *The heavens [i. e. God] have mercy upon thee.* See Buxtorf's *lex. Chald.* &c. And *Shem* was the name of that son of Noah, who after the flood had the birthright

Be but the shadow of heav'n, and things therein
Each to each other like, more than on earth is thought?

Parad. lost. b. v. 571. &c.

• Η λευκη ζωνη αινιγμα τῆς καθαρισθῆναι τῆς τοῦ οἴκτου αἱματι.
Aretha in Apocal.

i. e. "The white robe is the enigma [emblem] of their
"being cleansed by his own blood." Which sufficiently
shews the word to have the signification I have given it.

transferred

transferred to him, and so became father of the line of *Christ*, the real *Shem-Jehovah*, of whom *Shem* was then the type.

Since שׁ, *shem*, is thus confessedly *name* in the singular; why שׁים, *shemim*, should be denied to be its plural, it is not difficult to assign the reason, when we consider the persons from whence we had our lexicons and grammatical rules, &c. Some may lay a great stress upon the authority of the Jewish Rabbi, as they are pleased to call themselves; yet they must remember, that they are the apostate race of those who killed the Lord of life, who alone had a right to the title of *Rabbi* or *Rubbi*, as being a person of of the *Rabbim* or *Rubbin*, as the Hebrew scriptures call the Deity; and who before had rejected the Trinity, of which this word in dispute bears evidence: so very unfit persons to be sole judges in a cause in which they are so deeply concerned as parties. If the Hebrew scriptures bear witness of Christ, as he assures us they do, we must not expect them clearly or faithfully explained in those points which express what he was to *be*, *do*, and *suffer*; or the evidence for the Trinity brought to light, of which the divinity in him was a person, by any of the men who rejected him and it; and whose posterity continue in their rebellion to the light to this day. If they

understood the scriptures, they would not produce, but conceal and smother the evidence for these points; if they did not, their evidence is worth nothing. But it is objected, That שְׁמוֹת is the plural of שֵׁם, and not שְׁמִים! But why may not each be the plural, the one masculine, and the other feminine, as we have חֲקוֹת, and חֲקִים, the plurals of the singular חָק, *statutum*? Will any one deny that חֲקִים is the plural of חָק, because חֲקוֹת is also used? The heavens, by way of eminence and distinction, may be called שְׁמִים, masculine, and other names שְׁמוֹת, feminine.—Besides, the verb שָׁם, or שׂוּם, from whence the noun שֵׁם is derived, signifies to *put, place, dispose, substitute*: Is. v. 20. *Wo unto the callers of evil good, and good evil; שְׁמִים, the substitutors of darkness for light, and light for darkness; שְׁמִים, the substitutors of bitter for sweet, and sweet for bitter.* And the heavens are the placers and disposers of every thing in this material system, as well as the viceroys and substitutes of the *Aleim*.—And let me observe here, that the apostates have served this word, as they have done אֱלֹהִים, made it a separate root, as if it had no relation to the verb שָׁם, which they write שׂוּם, though it occurs oftener without the ו. —Let us then leave the forgeries of these apostate commentators, and follow the natural construction of the Hebrew language, which

which makes שמים, the plural masculine of the singular noun שם; so the names, types, emblems, substitutes, or representatives. And of what they are representatives, *Psalms* xix. 1. informs us. The names, שמות, are the means of exhibiting, or are the emblems of the glory of God; and though there is no language, and their voice is not heard, yet they more plainly, than any created intelligent being can by voice, declare the essence and personality of those who framed it, to all men in all languages. This type is so expressive of the original, that it is impossible to evade it; and conveys the great mystery of the Trinity to our understandings by ideas of sense. The unity of the essence is exhibited by its unity of substance; the trinity of persons, by its trinity of conditions, fire, light, and spirit. Thus, its one substance in three conditions, shews the Unity in Trinity; and its three conditions in or of one substance, the Trinity in Unity. And in this material created trinity, as in the exemplar, none is afore or after other; but the three conditions, as the three persons, are co-eternal together and co-equal: for let philosophers and reasoners consider air in the action of fire, and let them tell me which of its three conditions, fire, light, and spirit, exists before or after the other, or which can exist without the other two. And as God has

created and framed this type, the heavens, into a machine capable of supporting themselves mechanically by perpetual motion and circulation, in imitation of perpetual life, and of communicating motion, and so life, to animal bodies; this is a type of the life they, the essence, have in themselves, and also an emblem and type of that life they, the exemplars, have given to the soul; and an emblematical earnest and pledge, that they will give it to the immortal bodies of men hereafter.

If we consult the writings of the Old and New Testament, we shall find the persons of the Deity represented under the names and characters of the three material agents, *fire, light, and spirit*; and their actions expressed by the actions of these, their emblems. As the part of the first person, according to the covenant of grace, was to take vengeance for sin, *Vengeance is mine, I will repay, saith the Lord*; so his emblem or type is the **חמה**, *chame*, the *solar fire*: and his wrath is described as fire, and its effects are taken from, and described by the effects of fire; Nah. i. 2. God **[אל]** is jealous, **[קנא]** and *Jehovah* *vengeful, and full of wrath*; **[בעל חמה]** *Jehovah* *vengeful to his enemies, and watchful* **[נוטר]** *against those that hate him*. Where **קנא**, and **נוטר**, (as observed to me by my worthy friend

friend Mr. Bate), are particularly expressive of the effects of **חמה**, or the manner of the acting of fire. It first heats inwardly;—increases gradually;—watches or searches where to break out, and so takes vengeance upon what confined or raised it. So verse 6. **חמתו**, *His anger [or wrath] is poured out as fire.* Num. xxv. 4. *That the fierce anger [Heb. **חרון**, another word for the solar fire] may be turned away from Israel.* Psal. xcv. 11. *I have sworn in my wrath, [Heb. **אף**, the fiery visage at the orb of the sun, the place where the spirit comes in, and the halitus goeth forth].* Is. lxvi. 15. *For behold, Jehovah will come with fire, to render his anger with fury, and his revenge with flames of fire.* Deut. iv. 24. *Jehovah is a consuming fire.* Chap. ix. 3. *Jehovah go over before thee as a consuming fire.* Heb. xii. 29. *Our God is a consuming fire;* and in many other places. The Heathens called the solar fire, *Father*; and made all things to be produced and begotten by fire alone. The sacrifices, which were typical of Christ, the real sacrifice for sin, were consumed, and so accepted by fire; and, upon particular occasions, fire from heaven fell upon the sacrifices, as marks of God's acceptance of the victim, and of his wrath being satisfied.—So, when Jehovah confirmed the covenant with Abraham, a fire, like that of
a furnace

a furnace, passed through the divided pieces of the sacrifice, and consumed them.—Fire fell upon the sacrifices which Moses offered at the dedication of the tabernacle, and upon the sacrifice of Manoah, Samson's father; and doubtless, though it is not expressly mentioned, upon the first sacrifice, namely, that of Abel.—So at the dedication of Solomon's temple, fire came down from heaven, and consumed the burnt-offering, and the glory of Jehovah filled the house: and accordingly, upon the sight of these his emblems, (the fire from heaven, and the glory), all the children of Israel fell down and worshipped Jehovah; which shews, that they knew them to be his symbols.—So in the contest between Jehovah and Baal, the decision was by fire: *He shall be of the Aleim who answereth by fire.*—*And the fire of Jehovah fell, and consumed the burnt-offering.*—And when the apostate King of Israel (who served the material agents, in opposition to what they represented, the true, the very Jehovah) sent his captains of fifties to take Elijah the prophet of Jehovah, fire came down from heaven at his command, and destroyed them. So, when Nadab and Abihu offered strange fire, the fire from Jehovah avenged the affront, and devoured them. And so, in the rebellion of Korah, fire from Jehovah consumed the

two hundred and fifty men that offered incense. So the visible appearance of Jehovah, or his *schechinah*, as the Jews call it, was fire breaking out of thick darkness. The appearance to Moses in the bush was fire : he led the Israelites through the wilderness by a pillar of fire ; and at the re-institution of the law by Moses, Mount Sinai was altogether on a smoke, *because Jehovah descended upon it in fire.*—*The mountain burnt with fire, unto the midst of heaven in darkness, a cloud and thick darkness.*--*There were thunders, and lightnings, and a thick cloud upon the mount.* And the Israelites called this appearance the glory and majesty of Jehovah. And Daniel says, that a *fiery stream issued and came forth before him.* So in the Psalms : *He bowed the heavens, and came down, and darkness was under his feet. He made darkness his secret place round about him, his pavilion condensed waters, with thick clouds of the skies. At the brightness before him, his thick clouds kindled, hailstones, and coals of fire.* So in Ezekiel : *A whirlwind came out of the secret place, the great cloud, and a fire infolding itself : and the fire was bright, and out of the fire went forth lightnings.*—As light and spirit are the peculiar titles of the second and third persons of the Trinity, (as I shall shew below); and as fire is really a condition of the heavens, as much distinct from light, as light is from

from the *spirit*; so *fire* is the symbol of the first person, who was in fulness of time to take vengeance upon the real sacrifice for sin, as his symbol fire did, in the mean time, consume the typical sacrifices.

The second person is called the *light*. *The people which sat in darkness saw a great light, [spoke of Christ]; and to them which sat in the region and shadow of death light is sprung up.—A light to lighten the Gentiles, and the glory of thy people Israel.—In him [Christ] was life, and the life was the light of men.—That was the true light, which lighteneth every one which cometh into the world.—And this is the condemnation, that light is come into the world, and men loved darkness rather than light, because their deeds were evil.—I am the light of the world: he that followeth me, shall not walk in darkness, but shall have the light of life. If then Christ be the light, and light be the life, those who reject Christ must walk in darkness here, be cast into outer darkness hereafter, and be separated from God, which is the life of the soul. And this gives the reason why they are such friends to darkness, and oppose the light. Yet a little while is the light with you, walk while ye have the light.—While ye have the light, believe in the light, that ye may be the children of light, [i. e. Christians].—I have set thee [Christ]*

to

to be a light of the Gentiles, that thou shouldst be for salvation unto the ends of the earth. So in the Old Testament: The Lord Jehovah is my light and my salvation: spoke (as proved by Mr. H.) of Jehovah the second person in Christ; for if there be three persons in Jehovah, each is Jehovah.—Shew thy servant the light of thy countenance.—O send out thy light and thy truth, that they may lead me, and bring me unto thy holy hill, and to thy dwelling.—Christ is called the light and truth in the New Testament; and it is he alone can lead us, and bring us to himself, his holy hill: For with thee [that is, Christ] is the well of life, and in thy light shall we see light. As Christ is the light, through him, and him alone, we must hope to see the light. Those who expect to see it by other means, will find themselves disappointed in darkness.

The second person is styled by *Malachi* the *sun* [or *light from the sun*, as *shemesh* signifies] of *righteousness*: *Mal. iv. 2. The sun of righteousness shall arise; called, Luke i. 78. ανατολη εξ υψους, the day-spring [or sun-rising] from on high.—I will give thee for a covenant [Heb. purifier] of the people, for a light of the Gentiles.—I will also give thee for a light to the Gentiles, that thou mayest be my salvation unto the end of the earth.—But I*
might

might run through the whole scriptures, were I to cite all the places where the *second person* is described under the name *light*, and other equivalent terms : for as he, in the compound person Christ Jesus, was the end of the law and prophets, of whom they all bare witness ; the whole scriptures were wrote to record him and his actions ; the Hebrew records, predictively, what he was to *be*, *do*, and *suffer*, for man's redemption ; the Greek records, that he was *that* person, and that he *did* and *suffered* what was predicted of him ; and so fully answered the predictions by the completion : and the believing Jews worshipped by types, in hope, through him who was to come, and be manifested ; and prayed through him, and the Holy Ghost, frequently, in words as plain as they can be expressed now ; though overlooked by modern Christians, by reason of their not understanding the emblem and type from whence the ideas are taken.

As *light*, the emblematical name of the *second person* of the divine essence, is the matter or substance of the heavens in irradiation from the fire of the sun to the circumference ; and is the ruler and chief agent in every action in matter ; diffuses beneficence every way ; gives life, the power of vision, the means of sensation and perception

perception of itself, and other objects, with the pleasures which thence arise; is the glory of the heavens, and the subject and object of man's admiration: so the person it represents, is, by covenant and cession of the other divine persons, the king, the ruler, the chief actor in the act of grace, and the divine œconomy; diffuses the benefits of his merits to all men; supports and gives daily bread to the souls of believers; and will enable them to receive, and furnish them with perception and pleasure, such as we can have no higher ideas of here; and will give, and make them capable of receiving a weight of glory from him to all eternity. So he is most eminently the glory; and the person to whom we ought to attribute the glory, the power, and the kingdom, for the glorious work of our redemption, for ever and ever, Amen. In short, he acts the same part in the spiritual irradiation, as his emblem, the material *light*, in the material irradiation; and the benefits of what he did and suffered for our redemption, are conveyed to us under the ideas and effects of what the material *light*, his type, does to the body. His miracles were all of the benign kind, answerable to his type, freeing men from those disorders and maladies, which, for want of a due mixture of light in a due degree, had,
through

through the malice of the powers of darkness, been brought upon them. His raising from the dead was giving light, and life, and delivering from darkness, the shadow of death: besides the emblematical evidence that he could and would cure the maladies of the soul, suspend its death, free it from the power of hell and sin, and raise the body when dissolved or rotten, as we term it, and so *arise with healing in his wings*, as *Malachi* words it, properly and agreeably to the type; *light* being the circulator of our blood and fluids, (as Mr. H. has proved), and the grand healer. For it is sufficiently demonstrated, by repeated chymical experiments, made by those who had no turn to serve, that those medicines are the greatest healers, restoratives, and &c. which contain in them the greatest quantity of the particles or fluid of light, (or fire, as they call it); as oil, for instance, which best cures the bite of the serpent.

The visible appearance or *schechinah* of the second person is also *light* or *glory*. Balaam prophesied, that a star should come out of Jacob; and an extraordinary *light* (such perhaps as led the children of Israel through the wilderness) prefigured the birth of Christ to the Magi of the east; and the glory of the Lord, with a personal appearance,

ance, human I suppose, made known his birth to the shepherds. His transfiguration was in light and glory; and his appearance to St. Paul, upon his conversion, was in light and glory, whose brightness was visibly distinguishable from, and above the brightness of the sun in its meridional splendour. And in the Old Testament, in almost innumerable places, we read of the glory Jehovah, or of Jehovah, appearing to the Israelites in glory, and acknowledged by them as the standing and well-known emblem of his presence: nay, where-ever it appeared, it immediately and infallibly, at first sight, determined the authority and commission of the prophet, and produced, at least, fear and outward submission in the most obstinate, and made them sensible of the immediate presence of the spiritual power of that person in that place whom it represented; and to this day rays of light or glory round an head, are the common emblem of Divinity. Christ, in the *Revelation*, calls himself *the bright and morning star*; and it is expressly said, that the *glory of God* and the *Lamb* will be to the new Jerusalem, and its happy inhabitants, what the material sun and light is to this earth and its inhabitants.

The *third person* has no other name but that of the *spirit*, with the addition some-
T
times

274 An ENQUIRY after Ch. 6.
times of *holy, separated*, Heb. קָרַשׁ. And
his actions in the spiritual œconomy are
agreeable to his type in the natural œcono-
my, such as *inspiring, impelling, driving,*
leading. Thus, Jesus is said to be *led, or*
driven, by the spirit into the wilderness *;
and believers are said in scripture to be
sanctified or separated by the Holy Ghost the
Comforter, &c.; all in terms taken from
the actions of the material spirit, which
moves all useful things in their proper cour-
ses, separates all things noxious or offensive,
and drives them off; and cools, refreshes,
and allays the heat of the body, so com-
forts, &c. When he descended upon Christ
after his baptism, it was in the appearance
of a dove, the known emblem of the ma-
terial, and thence of the immaterial spirit;
and on the day of Pentecost, after Christ's
ascension, when he proceeded from the Fa-
ther and the Son, according to our Saviour's
promise while on earth, he came in a *rush-*
ing mighty wind, the symbol of his presence,
and filled all the house where the apostles,
&c. were assembled together. The texts in
the Old Testament which mention the Spi-
rit Jehovah, or of Jehovah, are too many
to cite, and too plain to be mistaken.

* Matth. iv. 1. Mark i. 12. Luke iv. 1.

As the idea of the personality of the divine essence is thus carried through under the names and actions of the material substance of the heavens, in its three conditions, of fire, light, and spirit ; each person of the eternal essence acting the same part in the spiritual œconomy and spiritual irradiation, as each condition of the material substance acts in the natural œconomy and material irradiation : this, to unprejudiced persons, must go a great way in confirmation, if not amount to a proof, of the scripture-doctrine of the Trinity.

If infinite wisdom thought proper to write the *characteristics* of itself at first, in the book of nature, the heavens ; it is reasonable and natural to suppose, when he revealed himself to men by writing, he would order his servants, the inspired penmen, to record by letters the essence and manner of existence of him, the Deity, agreeable to the characters before wrote in nature. And as the one substance of the heavens, in its three conditions, of *fire*, *light*, and *spirit*, is representative of the undivided essence in three persons, *Father*, *Son*, and *Spirit* ; we may expect in their writings to find a singular word to express the essence, and a plural one to denote the persons.

Accordingly we meet with, in the Hebrew scriptures, the singular name יהוה, *Jehovah*, and the plural אלהים, *Aleim*; both, indeed, used for the *Supreme Being*, and translated generally *Lord* and *God* *; though sometimes so placed as evidently, from the context, to shew that they have a distinct radical idea, and are intended to express some sort of personality in the *one* essence of the Deity. The contest between Elijah and Baal's prophets, was, Whether *Jehovah* or *Baal* was *Aleim*? Now, this evidently proves, that the words *Jehovah* and *Aleim* cannot mean the same thing with regard to the Deity, but must have distinct radical ideas; because the contest shews, that *Jehovah* and *Baal* were beings *toto cælo* different, which each side took for what they signified under the term *Aleim*; both agreeing in what *Aleim* was, but not which essence was *Aleim*: so the being each took for supreme, was to be worshipped, as being *Aleim*, whatever may be expressed by that word. That it is not the incommunicable essence which is expressed by *Aleim*, is evident from hence, because that name is given to men; which plainly shews, it must carry in it the idea of some condition or ob-

* I say generally, because *Jehovah* is very often rendered *God* in *Ezekiel*.

ligation which the persons so called were under, and took that name from. So it is not an essential, but a conditional one. Which seems farther probable from the grand precept of the law, *Hear, O Israel, Jehovah our Aleim is one Jehovah*. Now, the personal pronoun *our* being joined to *Aleim*, puts it beyond dispute, that it must be a relative name of office or condition, or &c.; and *Jehovah* being joined to it, implies some relation in which Jehovah stands towards his creatures by the name *Aleim*, which as Jehovah he doth not, which therefore never has any of the relatives *my, thy, our*, or &c. added to it. And as *Aleim* is confessedly plural, and *Jehovah* singular, and has no plural; it strongly intimates, that Jehovah *Aleim* being said to be *one Jehovah*, is upon account of the plurality of persons included in the plural word *Aleim*; that it might not lead into a mistake of more Jehovahs than one, but that the plurality of persons in *Aleim* were but one Jehovah.

The name *Jehovah* is allowed, both by Jews and Christians, to signify the essence, the *ο ων, και ο νν, και ο εσομενος*; and, according to Mr. H. it is derived from *jah*, the essence, and *bovab*, existing with powers necessarily and voluntarily in itself. So Jehovah is the being necessarily existing of

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and from himself, with all actual perfecti-
ons originally in his essence.

As Jehovah is absolute and essential, so **אלהים** is owned to be relative, and official, and reckoned among the names of God which are taken from his attributes, or works. And as it is a name frequently joined with *Jehovah*, who is termed the *Aleim* of Abraham, Isaac, and Jacob; of Israel; nay, of all the earth; it naturally leads one to conclude, that this name carries in it the idea of some act of grace, whereby Jehovah was graciously pleased to make himself known to his fallen creatures. The thoughts of absolute perfection (such as the name *Jehovah* implies) must be dreadful to fallen man, who has lost all that was perfect in him, and forfeited all right to absolute goodness or mercy, which he could only face when in his perfect state; and absolute justice must, irrevocably, condemn him to absolute and eternal misery. As Jehovah therefore condescended to own himself the *Aleim of the whole earth*, that is, of lost fallen mankind; and as he made a covenant, which he swore by himself to perform, that he would, in his own proper time, retrieve and redeem lost man, by a person of the Godhead taking flesh, and suffering in his stead; it looks highly probable, that the word *Aleim* was intended to convey, to man,
some

some idea of this covenant in his favour, entered into, among themselves, by the three persons of the Deity ; to which, as each was a party, it carries along with it the reason why *Aleim* is plural, and why every nation gave that plural name to, and contended so warmly for what they worshipped as God, being *Aleim* ; as being a name adapted to the condition of fallen man, and expressive of the salvation of which they stood in need, which *Jehovah* was not.

These considerations naturally determine to Mr. H's derivation of the word **אלהים**, *Aleim*, from **אלה**, *Ale*, an oath, or conditional execration, which persons put themselves under to perform a covenant ; so **אלה**, *Ale*, as a person, one under a conditional execration, and plural *Aleim*, more persons than one, under a conditional execration. And this name, suitable to the genius of the Hebrew, affirms the making of a covenant, as much as if it was described by a circumlocution of other words ; for when the verb and noun express the same thing or action, the noun is sufficient without the verb. For calling A the maker, implies he made ; so calling the Deity creators, implies they created ; and calling them *Aleim*, is affirming they had entered into an *Ale*, from which they took that name. And so the

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same three radical letters in Hebrew, as in
אלה, are both the verb and noun, and ex-
press the doing the action, the person who
hath done it, and the action itself.

The word *Aleim* does not, indeed, in-
form us what the conditions of the cove-
nant were; only that a covenant was made,
which they bound themselves to perform.
But the terms are plainly enough to be col-
lected from the scriptures; which inform
us of man's fall, and of the promise then
made, that the seed of the woman should
bruise the serpent's head. And as it is al-
lowed by our divines, that a covenant was
made to redeem fallen man, why should it
then seem strange, that the divine persons,
who made it, should take a name expres-
sive of that action?

To this I may add, that the scriptures
frequently represent Jehovah as swearing,
and referring, as it should seem, to some
original oath, under which he was bound
to his creatures men, as well as men to
him: *By myself have I sworn, saith Jeho-
vah, that in thy [Abraham's] seed shall all
the nations of the earth be blessed.* Which is
an oath of the same import as the original,
namely, to redeem fallen man by the in-
carnation of the second person of the Trini-
ty.—*I have sworn by my holiness, that I*
will

will not fail David.—*Jehovah hath sworn, and will not repent, Thou art a priest for ever after the order of Melchizedek.*—But in these places the word **נשבע** is used, and not **אלה**; which is made an objection to Mr H.'s sense of *Aleim*. But this proceeds, I think, from not distinguishing between the radical ideas of the two words: though, if I may presume to judge from the temper of the objectors, as it shews itself in their writings, they would have made objections whatsoever word had been used. **שבע** is not properly to *swear*, or pronounce a curse, which was the form of giving and taking an oath; the idea is perfect, compleat, sufficient; and the verb is used in this sense in *kal*, the active conjugation. In *niphal*, the passive, it is translated to *swear*; but, according to the idea, signifies to be made *perfect, compleat, sufficient*; so made fit to be trusted, or relied upon, by being bound, as we say of a person when he hath executed a bond, or taken an oath; and the word implies the whole transaction, or execution of the deed, whereby what is done, becomes a security, as we call it, to explain myself as well as I can after the manner of men. And **אלה**, as a verb, is to pronounce or denounce a curse; which, as it appears from scripture and antiquity, was the form of administering and taking an oath, and the method of entering into and ratifying covenants; namely,

namely, by pronouncing a curse on the one hand, and consenting to it on the other; as *Deut. xxvii. 26. Cursed be he that confirmeth not all the words of this law to do them: and all the people shall say, Amen.*—

And in *1 Sam. xiv.* the two words אלה and נשבע are used equivalently. *vers. 24.*

Saul [יאר] put the people under an ale, saying, Cursed be the man that eateth any food.—

vers. 26. And the people feared [השבעה] the

oath. vers. 27. But Jonathan heard not when his father [השביע] charged the people with the

oath.—*vers. 28. And one of the people said, Thy father [השבע השביע] straitly charged the people with an oath.*—

From hence we may gather, that the person who pronounced the curse on others, was himself concluded under it; for had Saul eat any food, he would have incurred the curse as well as any of his subjects; and that Jonathan, who heard not the curse, was yet included in it. And we likewise learn, that נשבע, *nisbang*, includes אלה, *ale*, and implies the same action; and that being under a *nisbang*, implies being under an *ale*. So Abimelech says to Isaac, *Let there be an ale, curse pronounced, between us: and [ישבעו] they swear to each other; that is, gave to each other the security desired, by each denouncing or pronouncing a curse, which included each other.* So we see that אלה, *ale*, and *nisbang*, are

are equivalent, though not synonymous. **אלה** is simply a bann or curse, and **שבע** is the satisfaction or security which arises from an oath, which was administered by an *ale* denounced.

As the form of administering oaths and confirming covenants among the Hebrews, so widely differ from the form among us, it is no wonder if we labour under the deficiency of proper English words by which to express the Hebrew; which has afforded matter to the minute critic to cavil at. But I hope for a reasonable indulgence from the candid reader. And I presume he may now perceive how little force there is in the objection, That *Aleim* cannot be derived from *Ale*, to denounce or pronounce a curse, which was the manner of administering and taking an oath, because *nisbang*, an equivalent word, is used when God is said to swear. And it is as if a person should object to the word *obligor*, being a name taken from the obligation of a bond, because the obligor is also said to be *bound*, or to have given security. By the persons in Jehovah being denominated *Aleim*, is expressed, that they pronounced a bann or curse, whereby they bound themselves, as well as man,—man to accept or suffer the terms proposed, themselves to fulfil them. And *Jehovah nisbang* implies, that Jehovah was bound,
or

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 or had given security under an *Ale*; just as
 in *Sam. xiv.* שבע, *shebang*, implies אלה, *Ale*.
 And as, when one of the people told Jo-
 nathan, that his father השבע השביע, *had*
charged them with an oath, the act of Saul
 putting the people under an *Ale*, in which
 Saul himself was included, is evidently im-
 plied under the word שבע; why should it
 not, when joined with Jehovah, imply, that
 the persons of the Deity were under an אלה,
Ale, so אלהים, *Aleim*?

As the opposers of Mr. H. have shewn
 the world how much they lie upon the
 catch, I expect they will ask, If God is not
 to be trusted without an oath? and fasten
 upon me this question of theirs as a blas-
 phemous assertion of mine. To avoid any
 such impious suggestion, I beg leave to ob-
 serve, that, among men, we often require
 an oath, when we have not the least doubt
 or suspicion that the person is not fit to be
 trusted without such security. So when a
 jury is impannelled, such persons are sup-
 posed to be chosen for that purpose as might
 be trusted upon their bare words; yet they
 are sworn to give their verdict according to
 evidence; this act of swearing them being
 a legal qualification that fits them for their
 office. — So God's oath, or swearing, may
 be termed his *covenant-qualification*, which
 in condescension he gives us. *An oath to*
men

men for confirmation being an end of all strife; wherefore God willing more abundantly to shew unto the heirs of promise the immutability of his counsel, confirmed it by oath. This is the reason the author of the epistle to the Hebrews gives for God swearing to Abraham. And it will hold with regard to the antemundane oath, whereby God engaged to destroy Satan and his adherents, and to protect, and finally give victory to all his faithful servants, by our Lord Jesus Christ. Was not God's promise to Abraham sufficient without an oath? yet God confirmed it by an oath: why? that *by two immutable things, in which it was impossible for God to lie, we might have a strong consolation.* Why then should an objection lie to his confirming by an oath what he promised before the world began? God's promises to Abraham, David, &c. are only references to the covenant before the world; why should not his oath to them, by which he confirms those promises, refer to the oath by which he confirmed the covenant before the world? or why is God said to swear at all, if not in reference to the antemundane oath?

Although man was not in being when Jehovah, by denouncing or pronouncing an אלה, *Ale, bann, or curse*, on all who shall not keep the words of his law to do them, entered into the original antemundane

dane

dane covenant to redeem man in case he fell; yet his enemy the devil, who plotted and effected his fall, and his angels, were then in being: and men, though not in being, could be bound by the curse pronounced, as well as men, to the end of the world, are bound to perform the commandments and laws of God, and his Christ, although they were not in being when the commandments were given, or the laws made.

And hence we see the reason why Moses, in his account of the creation, uses the name *Aleim*, *The Aleim created the heavens and the earth*; thereby giving the Jews, and all mankind, the comfortable assurance, that they who created the world and man, had engaged themselves by oath to be his Redeemers. So, in letting us know that man was created in the image of the *Aleim*, the idea of the name gives us this hope and confidence, that as man was created in the image of those persons, who, after his fall, took upon them the work of his redemption, they were able and willing to restore the lost image, and to give him the happiness which he forfeited by his fall from his first state. And this also gives the reason why kings were called *Aleim*; because, as typical saviours and deliverers, they were bound, by their coronation-oath, to expose them-

themselves to battles, wounds, and death, for their people, to save and deliver them from sword, slavery, and death; typical of what was to be done for them by the real *Aleim*, the real saviours, who were to deliver them from the wrath of the offended Deity, the slavery of Satan, and the death, if I may so speak, of the soul, *i. e.* its separation from God. So they are called אלהי אלהים, the *Aleim* of the typical *Aleim*; carrying in these two words (as the late Mr. Calcot observes) an useful lesson to princes, that they who were to be the temporal deliverers of others, were themselves to depend on them the *Alei Aleim* for their own eternal salvation.

There is another word in the Hebrew for God, which Mr. H. takes to be a deflection of this word *Ale*; and applied only to one of the persons of the Trinity, because only one of them was to be, in time, in that condition which that deflection of the word describes. The name I mean is אלוה, *Alue*, the participle passive of the verb אלה, which is used as a noun, as participles in other languages are used; so may be rendered *execratus*, or *execratio*, or κατάρα, by which the LXX. render the noun אלה. This name Mr. H. thinks is appropriated to the second person in Jehovah, who was made a curse for us that were under

der the curse, to redeem us from the curse of the law. That Christ was made a curse, may not be denied. The Apostle calls Christ a *curse*. The name **אלוה** signifies one *execrated*, or made a *curse*: and as the second person of Jehovah was in time, in the covering of man, made a curse for man, to redeem him from the curse of the law; the name **אלוה**, *Alue*, belongs to the second person alone. The second person might have been called **קללה** and **ארור**, as well as **אלוה**: but **אלוה** seems, upon this account, to be appropriated to him; because the word in itself expresses, that one of the **אלהים**, *Aleim*, was to bear the curse for man. *Aleim*, in *kal benoni*, denotes those who denounce a curse; and *Alue*, in *pakul kal*, signifies one cursed: so the three persons of the Trinity are *Aleim*, in which the second person is not only comprehended, but also is styled (which neither of the other is) *Alue*. And God, by his prophets, makes a noble challenge, not only to the false gods of the Heathen, but to all the false means and methods of salvation which men have since devised, as their own righteousness, the sufferings of a man, &c. *Who אלוה, Alue, beside Jehovah?* that is to say, Who hath engaged to bear, or who can bear the curse, but Jehovah? No wonder if truths so repugnant to the pride, and, as times go,

to

to the preferment of men, meet with opposition.

Whatever occasion there might be for the knowledge of the distinction of persons in the divine essence before, there became an absolute necessity for that knowledge after the fall; as each of these divine persons had a distinct, separate part to act in the œconomy of grace: and as one of them was, in man, to suffer for Man, and so perform the work of our redemption, it was immediately necessary, both to exhibit the Trinity, and the man taken into it; because *what* was prefigured by this exhibition, was to be the means and manner of our salvation. Hence we may reasonably expect and conclude, that the revelation of these important points would commence from that period of time when it became so indispensably necessary.

Accordingly we find, that after the transgression and fall of Adam, and the gracious promise, that the seed of the woman should bruise the head of the serpent, an exhibition was made of the cherubim at the east of the garden of Eden, man's late happy abode; but from which he was then expelled, because his former state, condition, and terms of salvation, were now abrogated, and

U

new

new terms instituted, upon which he and his posterity were to obtain eternal life.

And it is here worthy of observation, that as his abode in Eden ended with his first state, so this exhibition of the cherubim and flaming sword began with his second. The Jews, and I wish I could say none but the Jews, would persuade us, that this figure was a scarecrow, to keep unhappy Adam from coming at the tree of life ; and many of our commentators, otherwise excellently learned and good men, treading in the steps of those blind guides, have thereby exposed this part of scripture to the scoff and ridicule of infidels.

But Mr. H. has shewn, that this could never be intended ; because the tree of life is, even under the gospel, made the emblem of that eternal life and happiness which is promised, as the reward of those who embrace and hold fast that gracious dispensation.——*To him that overcometh, [says Christ in the Revelation], will I give to eat of the tree of life which is in the midst of the paradise of God.*

And indeed all the institutions and services appointed after the fall, are only so many typical methods to point out the new and living way to the tree of life.

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The old way was cancelled, abrogated, and now made insufficient, by man's own act and deed; and *that* life and immortality, of which the fruit of the tree of life was the sacred pledge, and the sacrament, were forfeited; so *that* emblematical sacrament became ineffectual. But the real tree and real fruit still remained, and a new way was mercifully contrived, provided, and revealed; which was Christ, the reality, *the way, the truth, and the life*; and who is described to be what was typically represented by the tree of life.

Now, this figure being exhibited immediately upon the revelation of this new way, by the promise of a Redeemer, it looks highly probable, that it was intended to point *it* out to man; especially if we take in some considerations which will be made below.

So the cherubim, and flaming sword, or fire returning, and circulating back into itself, were the supernatural exhibition, emblematical of the manner and means of our redemption, and explanatory of the promise, that *the seed of the woman should bruise the head of the serpent*; typically shewing what in *fulness of time* was to be done by the *Aleim*, on their part, to retrieve lost man; and what was to be done by man, on his part,

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until the reality came, and the satisfaction
was made.

The cherubim were a representation or figure, with four faces or visages, and one body; the face of the bull, the faces of the lion and man united, and the face of the eagle; thereby exhibiting to sense the Trinity in Unity, and the Unity in Trinity; and also the incarnation of the *Logos*, the second person in the Trinity, by the union of the lion and the man. And as the first coming of Christ to take upon him flesh, was thus emblematically represented in the figures of the cherubim, as a thing covenanted to be done, they were both predictive and a pledge of the completion.

That these three animals, the bull, the lion, and the eagle, were emblems of fire, light, and spirit, throughout the whole Hea-then world, is known to every one the least conversant in Pagan antiquity *. And the

* *Psal. xviii. 10. the spirit is called a cherub: He rode upon a CHERUB, and did FLY; yea, he did FLY upon the wings of the SPIRIT. The spirit therefore was the CHERUB upon which he did FLY. And Psal. xcix. 1. the three agents in nature, fire, light, and spirit, or at least two of them, the light and spirit, are (as I think) called CHERUBIM: Jehovah sitteth between the cherubim, let the earth decline. The natural agents, the fire, light, and spirit, seem to be the cherubim here meant, by whose mechanical operations the earth is caused to decline.*

human

human figure being joined to that of the lion, was very expressive of that person, who was to be God-man,—bruise the head of the serpent, and have his *heel*, the mortal, human part of him, bruised, as in the promise to our first parents after the fall.

And it looks highly probable, that *this* gave rise to the heroes and demigods of the Heathens, supposed to be sons of Jupiter begotten on a mortal woman, such as their Hercules, &c.; and as the tradition became more and more darkened and confused, set their Alexanders, &c. upon bribing the priests to be pronounced by the oracle the sons of Jupiter, to take the titles of Θεός, *Deus*, Σωτήρ, *Saviour*, and to aim at universal empire.

That this was the figure of the cherubim, is evident from the prophet Ezekiel, who, in chap. i. 10. describes it to consist of the four faces, as above; though the order in which he places the animals is varied, and different from each other, in the two chapters, for reasons assigned by Mr. H. and which will be mentioned below. In chap. x. 20. he expressly says—*And I knew they were the cherubim*; which supposes a previous knowledge of the likeness of the cherubim: and what could this like-

ness be but that of those placed in the *sanctum sanctorum* of the tabernacle, and temple of Solomon? And as there is four times mention made of the cherubim in scripture, and only this one description of their particular figure, the most scrupulous man cannot hesitate to admit, that this was their common figure and form; and that the cherubim undescribed were the same, as to form and hieroglyphical meaning, with those described by Ezekiel; unless he will impeach divine revelation of studied intent to mislead us in those points in which it was given to direct us. And we may as well say, that the *Aleim* of Moses and Ezekiel are not the same, as that the cherubim mentioned by them are not the same.

As the bull was the known emblem of the fire at the orb of the sun, the lion of the light issuing thence, and the eagle of the spirit returning to it; and as the fire, the light, and the spirit, the three conditions of the one substance of the heavens, are shewn to be the representatives of the three divine persons in one essence, which they themselves have chosen to represent themselves by; it appears, that the three faces of these three animals on one body, with the human figure united to that of the lion, (the emblem of light, the emblem
of

of the second person), was, in hieroglyphical writing, very expressive, and very proper to convey the knowledge of the Trinity in Unity, and the great mystery of man's redemption. But what did the flaming sword represent? and how did *it turn* to keep the way of the tree of life?

Without entering into a critique or dispute about the strict meaning of the Hebrew words translated *flaming sword*, &c. the outward obvious sense will be plain enough.

The way to the tree of life, or what it represented, was now through fire and sword; but, by the covenant of grace, this was to be turned from the criminals, and fall upon their surety, Christ; as *Psal. lxxx. 17. Let thy hand be upon the man of thy right hand*, [his position in the cherubim], *upon the son of man, whom thou madest strong for thyself*. So the fire and sword, or flaming sword, kept the way to the tree of life, and instituted man's part of the covenant, by the observance of which he was to *keep* the way, viz. by typifying the wrath in fire and sword, upon the bodies of typical beasts in sacrifice, before these typical faces of the cherubim, until the real wrath of the Father was actually turned upon the real sacrifice, the body prepared for it, the humanity of Christ the surety; and thereby

the real way to the real tree of life, the real entrance into the holiest, was laid open by the blood of Jesus, *by a new and living way which he hath consecrated [or new-made] for us through the vail, that is to say, his flesh:*

Thus the covenant of grace was revealed in the cherubim; and the promise of a Redeemer made to our first parents, couched under the emblematical words, — *I will put enmity between thee [the serpent] and the woman, and between thy seed and her seed: it shall bruise thy head, and thou shalt bruise his heel,* was explained by these emblematical figures: and thus sacrifice was instituted, to keep the way till what it typified was completed. This fire and sword was first to bruise the heel of the seed, and then be turned to the head of the serpent. This was done by the sufferings and death of Christ, and his conquest over sin, death, and hell; and will be completed when he hath finally beat down Satan under our feet, and death is swallowed up in victory. And till this be finished, we now keep the new and living way to the real tree of life, by partaking of bread and wine, the new memorials of the body of Christ broken, and his blood shed for us, in the sacrament of the new testament (*i. e.* the new terms of purification) in his blood.

That

That the exhibition of the sword, joined to that of the cherubim, was an emblem of the wrath of Jehovah against sinners, and which, had there not been another sacrifice provided by his mercy, must have fallen upon the criminals, Adam and Eve, and their posterity, seems pretty evident from some places in scripture, where the same emblematical appearance is recorded, expressive of the same thing.—When Balaam * went, with an evil intention, to curse the people of Israel, the then church of God, for the sake of preferment, the angel of Jehovah, or the angel Jehovah, withstood him with *a sword drawn in his hand*; which, as soon as he saw it, he knew, and acknowledged to be the emblem of wrath; confessed, and asked pardon for his sin.

The destruction of the people in David's reign, by the plague, for his numbering them, is represented under the exhibition of the destroying angel, the angel Jehovah, with *a drawn sword in his hand*, stretched

* Balaam was a kind of halter between God and Mammon. He lusted after the golden bait of Balak's offered preferment; but was desirous of keeping fair with believers, and saving appearances of religion. He would not for ever so much curse the children of Israel; but he gave Balak that hellish piece of counsel that brought down the curse and wrath of God upon them.

out over Jerusalem; and when the plague ceased upon sacrifice, typical of the real sacrifice of Christ, Jehovah commanded the angel, and he put up his *sword* again into the sheath. David and the Elders of Israel knew this appearance to be emblematical of the wrath of Jehovah; and accordingly, cloathed in sackcloth, fell upon their faces: and the historian adds this remark, that “David was afraid because of *the sword of the Angel Jehovah.*”

The person who appeared to Joshua, by Jericho, had a *sword drawn in his hand*; but its edge was directed to the inhabitants of that idolatrous city, whose iniquity was full, and who were upon the point to receive the reward of all their spiritual fornications. This person is called the Captain of Jehovah's host, and was worshipped by Joshua; and is generally allowed to have been no other than Jesus, the Captain of our salvation, in an human form, as the prelude of his incarnation. And I think the incuration paid to the other appearances plainly proves, that by the angel Jehovah is meant a person of the Trinity, and not a created angel. Those who maintain the contrary opinion, alledge in its behalf, that though the appearance is styled and addressed to as Jehovah, yet it is only as ambassadors take the style and act in the name of the

the prince their master. But this, though allowed, will not serve their turn: for typical incurvation never was, nor is paid to an ambassador, which is only due and paid to the person of the sovereign himself; neither do ambassadors ever assume the name of those they represent, or say, I will do so, but, We are commissioned to do and say so and so.

From these appearances of the the angel Jehovah with the sword, which probably might be like a flame of fire, it seems pretty plain, that the sword was the emblem of the wrath of God upon sinners, and its appearance the signal of its threatened execution upon them. And probably to this St Paul alludes, when he says, *The word of God [i. e. Christ] is as a two-edged sword*; the sword, the executive power of the wrath, being, by cession and covenant, put into his hands after his resurrection. And accordingly in the *Revelation* he appears with it in his mouth, being about to exercise it, by his word, or by his command to his agents, upon the Jews.—And let me add, that the ancients formed their swords in imitation of a *flaming fire*; and that a sword was denominated *BRAND*; and *glad* or *glod*, that is, *titio, torris, pruna ignita*: and thus from *brand*, a sword, came our English phrase *to brandish a sword*

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sword; *gladium strictum vibrando corruscare facio*. And so in the second part of the *Edda Islandica*, the hall of the Odin is said to be illuminated by drawn swords *.

As the exhibition was so early as the expulsion of man from paradise, it shews how thence it might become the well-known emblem of the wrath of the Deity to all nations, Heathens and apostates, as well as Jews and believers. And this is conform to the idea throughout scripture, and explains the passages where these and such like appearances are mentioned.

From hence it will appear why the man Adam was driven out from the garden of Eden, namely, lest he should commit a second error as *fatal* as the first: and as he had been so weak as to imagine, that he should become like the *Aleim*, by eating of the tree of knowledge, he might also be tempted to endeavour to lay claim to life, by eating of its symbol, the tree of life, without acknowledging the forfeiture, or submitting to the terms which were now made the means of eternal life. So God removed him to the outside or suburbs, as the Heb. **כרש** expresses; because he could not now eat of the tree of lives, or enjoy that of which it was the sacrament, until

* See Hickes's Ling. sept. thesaur. cap. 25. p. 193.

certain

certain conditions were performed, which he, on his part, could not for himself perform. The tree of life was the symbol and seal of eternal life; that life being forfeited, its symbol of course was also forfeited; and therefore could not sacramentally be used, to obtain what it once was the outward and visible sign of, but which now, by his own act and deed, was forfeited. He might indeed have put forth his hand, took and eat of the tree, in vain hopes to live for ever: but this would have been adding a second crime of the same nature to the first, *viz.* rejecting the salvation of Christ, pre-ordained before, and in case of the fall; and presuming to attain without, what alone can be had through him. It would have been acting as the Deists now act, first assenting to the devil's assertion, of being as wise as the *Aleim*, in despite of the *Aleim*; and then attempting to gain eternal life and happiness by other than the appointed means, nay by means which his first crime had abrogated, and made of no effect; which was denying both covenants, or both parts of the covenant, and is the highest crime man can commit.

This exhibition, then, was an hieroglyphic of Christianity; was appointed, as Christ says of himself, not to destroy, but save sinners; and was conform and answerable

able to the terms of man's second state; which were not absolute, as the first, but changeable with his change of mind; as Ezek. xviii. 27. *When the wicked man turneth away from his wickedness, and doth* [Heb. יָעַשׂ] *that which is lawful and right,* [Heb. מַשָּׁמַט and צִדְקָה, i. e. typifies the object of judgment, and the justice, viz. Christ, who was to suffer for us, and thereby make us just, exhibited in this appearance of the cherubim and flaming sword], *he shall save his soul alive: that is, the sword was to turn, and rest on Christ the surety, and there really perform the judgment and justice due to God for sin, on man, to be only transitory; to turn from the wicked when he turns from his wickedness, and accepts the satisfaction of Christ; and to turn to the righteous, when he turns from his righteousness, [his by imputation, while he acknowledgeth that Christ performed it for him], and doth evil.* So this fire and sword devour none but those who wilfully reject the satisfaction of Christ, and set up their own righteousness, morality, and such like fashionable schemes of salvation.

This supernatural exhibition of the cherubim and flaming sword, was the antediluvian church and oracle, which pointed out the way to the tree of lives, which was
now

now to be through sacrifice and blood. From hence Adam had directions about the minuter circumstances of order, time, &c. which were not exhibited in the figures; and in any doubt, responses by immediate voice. To answer this end, the presence of the Deity must actually reside, or, as the text says, *Jehovah Aleim* inhabited in these; as he did in those of the *sanctum sanctorum*, of the tabernacle first, and afterwards of the temple: and no one can doubt but that it was to the same purposes in both. And this species of presence in them answered all the ends of religion to men, as well as if the real persons of Jehovah had essentially dwelt there; and was, besides, an emblematical evidence and prelude of what was really to be done upon earth by the real persons of the Deity, viz. by one of them essentially inhabiting the man Christ, and another of them resting upon him without measure.—And many Christian writers have asserted, that there was some such presence. And yet Mr. H's translating *Gen. iii. 24. He [Jehovah Aleim] will henceforward (viz. from the expulsion of Adam) inhabit the cherubim*, or the substance of the cherubim, has to some given great offence; because it breaks the rules of the apostate Jews, which, by their pointing, make it, *He placed cherubim*, as in our English translation. And I think this, to any unprejudiced Christian,

is

is one early instance, out of many which might be produced, of their wicked design and intent to confound Christianity and Christians by their pointing and rules: for had this text been translated, as it would have been without points, *He then drove out the man, and then inhabited the cherubim*, there neither could nor would have been any doubt, that these cherubim, and those in the holy of holies, were the same, and to the same end, viz. instituted emblems of the new covenant, attended by the divine presence.

And indeed, if we consider how frequently God in scripture is represented as dwelling,——sitting in or on,——inhabiting the cherubim, no objection can be reasonably made against this construction of the text above.——And St. John, in his gospel, has a term for the Divinity or *Logos* inhabiting the humanity of Christ, so strong, so express to the purpose, as to put the matter out of all dispute with any but a pertinacious objector: chap. i. 14. *And the Word was made flesh, and [in that flesh] ἐσκηνώσεν, lodged [as in a σκηνή, tent or covering] among us.*——Now, if there had been no precedent presence of the Deity residing in the figures of the cherubim, to which the expression might refer, it would be of no force, and, I think I may add, would not,
at

at least could not so properly, have been used.—But taking the matter as it really is, that the *σκηνη* was the place or residence of these figures, where that person who really inhabited the man Jesus potentially resided and inhabited, and where he appeared in the cloud upon the mercy-seat, the expression is just, strong, apt, and beautiful, makes its own reference, and shews whence it had its rise.—It is saying much the same that St. Paul says to the Hebrews, that *God who at sundry times and in divers manners manifested himself in time past unto the fathers*, [by cherubim, urim, thummim, fire, cloud, appearances of men, &c. in all which a species of his presence *שכן*, inhabited], *bath in these last days manifested himself unto us by his Son; in whom* [in the manhood] *dwelled* [Gr. *κατοικει*, inhabited, as in a house, or &c.] *all the fulness of the Godhead σωματικως, substantially, or bodily, as in the cherubim potentially.*

As the Jews were not willing to tell us what were the figures of the cherubim, so they have deceived us in the derivation of the word. They are indeed more honest than many of their followers, in allowing *כ*, *caph*, to be a servile and prefix, and so the word *כרובים* to be a compound; but they make the same use of this letter as the devil did to Eve, when he told her they

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should

should be כְּאֱלֹהִים, namely, to deceive those who trust their assertion : for, according to them, כְּרִנִּים is from כ, *caph*, *like*, and רִנִּיָּא, *a boy* ; whence our great men have designed the figures of the cherubim after their idle stories, and represented them by two *blubber-cheeked boys*.

BUT Mr. H. derives the word from כ and רָנִים. רֹב or רַב, *Rub* or *Rab*, is the highest epithet the Hebrew tongue affords ; is great in *strength*, *power*, *wisdom*, or whatever can be termed a *perfection* : and כ, *caph*, is *sicut*, a *similitude*, or *representative*.—— So cherubim is *like the great ones*, or the *similitude* or *representation* of the *great ones* ; and the beasts which were their representatives, the *bull*, *lion*, and *eagle*, were emblems of the *fire*, *light*, and *spirit*, and also chiefs of their respective kinds, so themselves רָבִים, *Rabim*. The Heathens had a temple to the substance of the heavens, in its three conditions, of *fire*, *light*, and *spirit*, under the title of *Beth-Rubim*. Philo, the Jew, knew, that the *fire*, *light*, and *spirit*, were called *Rubim*, so makes them his δυναμεις, *potentates*.—— And Mr. H. shews, by many texts of scripture, that the persons of the Trinity are all of them called *Rabim*, and each of them *Rab*.

And

And this is exactly agreeable to *Ezekiel*; who, chap. i. 1. calls the cherubim **מראות אלהים**, *a representation to the eyes of the Aleim*; for so **מראה** signifies: and chap. x. 20. says, they were *vice Aleim*, or *substitutes* of the *Aleim* of Israel; for that is the meaning of the word **תחת** there, and not *under*, as in our translation. That **תחת** implies a substituted or vicarious person or thing, appears from two texts of scripture, where it is used in this sense: *Gen. xxx. 2. Am I תחת אלהים, in God's stead, or in the stead of God?*——Chap. l. 19. *I am תחת אלהים, in the place of God.* So this figure of the cherubim was in the stead, or in the place of God, the *Aleim* of Israel.

But it may here be asked, If this figure was the representation of the *Aleim*, why was it not called **כהללים**, *Che-Aleim*, rather than **כרבים**, *Che-Rabim*? To this, from Mr. H. I answer, That as the man was taken in, and made one of them, they could not be called *Aleim*, or *Che-Aleim*; because the covenant expressed by that name, was, and could be entered into by the persons of the *Aleim* alone: but as the man was begotten in a supernatural manner by the *Rabim*, the *great ones*; supported in the course of his ministry by their means, without sin, so their perfect image; and at last, after

having finished the glorious work of our redemption, upon that account taken into their essence by an inseparable union with the second person; he thereby became a *Rab*, a *great one*; and so they might all be termed properly *Rabim*, and the figure *Che-Rabim*. *Is.* liii. 10. &c. has so fully and strongly expressed the taking in of the man into the essence of the *Rubim*, and it is so finely explained by the late learned Mr. Catcot, in his *answer to the observations upon his sermon*, p. 60. that I need no apology for citing it.—“ *Is.* liii. 10. 11. 12. He shall
 “ make נפש, his frame, [or body], an offering for sin. ברעתי, By [or in] his experimental knowledge [of good and evil]
 “ (the same word as is used *Gen.* iii. 22.)
 “ my righteous servant, צדיק, [he who, by
 “ virtue of having discharged the debt for
 “ which he was bound, (and so was just),
 “ had power to set free (and so to justify)
 “ the debtors], יצדיק, shall make full payment לרבים, to the *great ones*:—therefore will I give him a part [or share]
 “ לרבים, in [or among] the *great ones*;
 “ because he hath poured out his frame
 “ unto death, — and hath bore [or carried
 “ up] חטא רבים, the satisfaction for sin,
 “ and reparation for damage of [*i. e.* due
 “ to] the *great ones*.

“ As

“ As the offence had been offered against
 “ the *Rubim* as such; as he who was to
 “ expiate the offence, and pay the debt,
 “ was one of the *Aleim*, and so could not,
 “ according to the part he was to act as
 “ such, (which was to pay the debt), be
 “ said, as such, to demand, and receive the
 “ satisfaction; and as the humanity was,
 “ after the sufferings were over, and the
 “ debt was paid, to be exalted to the king-
 “ dom, to be admitted to an equal share in
 “ all the perfections in Jehovah with the
 “ *Rubim*, the *great ones*: so it appears,
 “ that the title *Aleim* could not in pro-
 “ priety be used in this passage of *Isaiab*
 “ for the persons, but *Rubim*. Nay, the
 “ second person himself in the flesh ap-
 “ proves of his disciples giving this title to
 “ him, and shews the reason of his claim
 “ to it: *John xiii. 13. Ye call me Master,*
 “ *and Lord: and ye say well; for I AM,*
 “ *Εἰμι γαρ.* In which last words he asserts
 “ his own *necessary existence*, or that he was
 “ a person in the essence existing.”

If there yet remain any doubt, that the
 cherubim were the emblem of the Trinity
 and incarnation, let the place where these
 figures were placed in the tabernacle and
 temple be considered, and what the Jews
 themselves say about them. The holy of

holies, the place of their residence, was the acknowledged type of heaven, the immediate residence of the persons of the Deity. And the author of the book of *Cozzi* justly saith, That *the ark, with the mercy-seat and cherubim, were the foundation, root, heart, and marrow of the whole temple, and all the Levitical worship therein performed.* But this could not be, if the cherubim represented only created angels; because such neither were to make or accept of the atonement, by blood, which was once a year, on the day of expiation, typically made by the typical Christ to the typical faces of the cherubim: whereas, if *the ark, with the mercy-seat and cherubim, were the hieroglyphics of the covenant made for the redemption of man, and of the divine persons who made it; then they really were, as said to be, the foundation, root, heart, and marrow of the whole law, and Levitical services; because they all directly pointed to that gracious dispensation. And that the figure of the cherubim was the emblem of the persons in the Godhead, may be fairly deduced from the epistle to the Hebrews, chap. ix. 24. For Christ is not entered into the holy places made with hands, which are the figures of the true; but into heaven itself, now to appear [or be exhibited] in the the presence of God [Gr. τῷ προσώπῳ τοῦ Θεοῦ] for us. Now, if the high priest was the type of Christ,*
and

and the holy of holies the type of heaven, it demonstrably follows, that the cherubim were the types of the persons [τὸ Θεὸς] of the Godhead.

To what I have said, let me add the following considerations.—The cherubim, in the epistle to the *Hebrews*, are called *the cherubim of glory*; and St. Stephen calls Jehovah by the name of the *God of glory*, Acts vii. 2. *The God of glory appeared to our father Abraham*.—Now, as the cherubim have the same title or appellation as God, they must be the representatives of him, and not of angels. The *shechinah* too of the God of Israel and of the cherubim are the very same; clouds, darkness, and a fire infolding itself. The sound of the cherubim is said to be as the voice of the almighty God when he speaketh, and the glory of God attended them. And in the *Revelation* all the angels stood round about the cherubim, who were in the midst of the throne with the Lamb; so they could not be angels: and they are said to be full of eyes before and behind; which is an attribute given to no creature save the Lamb, who had seven eyes, because he was God as well as man. And in *Ezek. xliv. 2.* they are called *Jehovah the Aleim of Israel*.—Then said Jehovah unto me, *This gate shall be shut, it shall not be opened; because Jehovah the Aleim of Israel hath entered*

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in by it: that is, saith Grotius, upon the
place, *imago illa judicium Dei repræsentans, su-
pra*, chap. xliii. 2. 3.; which image was the
cherubim, as appears from the place cited,
and chap. x. 19.—There is indeed an ob-
jection made to the four beasts in the *Revela-
tion* being the representatives of the Trinity,
because in chap. xix. 4. they *fell down and
worshipped God that sat on the throne*. But
why should the cession of representatives
to the realities be a proof that they are not
therefore representatives? Doth the ambassa-
dor ceding to the prince prove him not to
be his ambassador? The Lamb, by appear-
ing as it had been slain, and opening the
seals, exhibited the manifestation of the re-
demption of man; and so, as Mr. H. says,
the *typical presence* under the *law*, in this
form, surrendered to the real presence of
the essence in Christ, the Lamb under the
gospel. In chap. v. 14. the four beasts only
said *Amen*, thereby acknowledging that all
was completed; and the four and twenty
elders alone fell down and worshipped him
that liveth for ever and ever.—It is also
objected, That chap. iv. 8. 9. the four beasts
and elders say, *Thou hast redeemed us to God
by the blood of the Lamb*. But if the gram-
mar of the 8th verse be strictly examined,
the text says, every one of them had harps
and golden vials; where the words in the
Greek are *ἐχόντες ἑκάστος*, in the masculine
gender,

gender, referring to πρεσβυτεροι, the elders, the more immediate antecedent ; and not to ζωα, or the four beasts, which is the neuter gender. And so the words, *Thou hast redeemed us*, are the words of the elders ; and not of the beasts, who only ratify all, and give their assent, by saying, *Amen*.

The mercy-seat is by the Seventy translated ιλασηριον ; and was, according to Mr. H. the emblem of the divinity ; as the ark was of the humanity, or incarnation of Christ. And to this probably the apostle Paul alludes in the use of this very word of the Seventy, treating of Christ's righteousness, *Whom God (saith he) has set forth to be [ιλασηριον] a propitiation, through faith in his blood, to declare his righteousness for the remission of sins past, through the forbearance of God*. And St. John uses a word of near affinity with the former, when assuring us that Christ is [ιλασμος] *the propitiation for our sins*. This shews, that the writers of the New Testament had reference to the types in the Old, and that the types of the Old were figures of the realities in the New ; and they reciprocally prove each other.

Now, we see the reason why there were two cherubs, one at each end of the mercy-seat. The figure or cherub at one end had two of the four faces, those of the lion and
man,

man, for instance, inward; and the other had the other two faces, the ox and the eagle, outward: and the two other faces, in the first figure, the ox and the eagle, must look inward; and in the second figure, the lion and the man must look outward: that by this means they might be represented as parties looking upon each other for the performance of their respective parts, and all four upon the mercy-seat, and ark of the covenant, the blood sprinkled, and the person who offered it, all typical of Christ and his actions; and thence that all the four faces might look outward over the vail towards the temple, to the typical services, prayers, and actions performed there, so to Christ's actions and sufferings, &c. in this world, which the temple without the *sanctum sanctorum* exhibited; and also that from the כפר, the mercy-seat, through the means and upon the account of what it and the ark they stood upon emblemmed, they might look beyond the pale of the Jewish church, to the ends of the world, and so be represented, as they had covenanted to be, the *Aleim* of the whole earth.

Mr. H. also shews why the creatures of the cherubim are placed in different order, (as in *Ezek.* i. 10. x. 14. and xli. 19. and *Rev.* iv. 7.), which clears up what has been objected to him. It was to exhibit the different

ferent scenes of the divine œconomy of grace, the covenant in the cherubim; which could not have been done had the same order of the creatures been preserved. In the first exhibition of this manifestation in *Ezek.* i. the man as a prophet, and the lion joined with him, was placed foremost, then the bull, then the eagle. The next exhibition, chap. x. the bull first, when he was to take vengeance on the man; next after the bull, the man, who was to act and suffer the part of the priest; next the lion; so there their faces are not exhibited united; and, lastly, the eagle. The next exhibition, chap. xli. where he is describing the Christian state, only the man and lion, when they contended for, or were possessed of the palm, the victory, by the sufferings, death, and resurrection of Christ. The next, in the *Revelation*, when the lion had conquered, and the man was suffering, the lion was first, then the bull, interposed between the man and the lion, then the man, and lastly the eagle. After that, the lion, the divinity, and the Lamb, the humanity, had the throne to the end of the *Revelation*. From whence it is plain, that the covenant of grace, in all its parts, was heroglyphically revealed in the cherubim.

The cherubim are called *the faces or persons of Jehovah*; as appears from several places

places of scripture cited by Mr. H. and others, upon the subject, from him ; particularly *Exod.* xvi. 33. 34. where the manna is ordered to be laid up before *the faces of Jehovah*; and so Aaron laid it before *לפני העדה*, the testimony, where the faces of the cherubim were. — Nay, there are some who were not over fond of M. H.'s method of interpreting scripture, who allow that *פנים* (to which, say they, *προσωπον*, or *person*, in Greek, answers) signifies in the Old Testament the persons of the Trinity; and say, that where we find in the Old Testament *the face of the Lord*, [Heb. *faces of Jehovah*], the sense is every person of the Godhead *. Yet what is remarkable, they will not own that the cherubim were types of the Trinity: though they would do well first to give us some other satisfactory account how such a phraseology took place. Whereas, if the faces of the cherubim are taken as representatives of the persons in

* The late Reverend Mr. Arthur Bedford, in one of his sermons preached at Lady Moyer's lectures, and printed 1740, in one volume octavo, cites *1 Kings* xiii. 6. where Jeroboam, upon his hand withering, says to the prophet, *Intreat now the face of the Lord for me*; that is, each person of the Godhead, says this author. In the Hebrew it is *the faces of Jehovah thy Aleim*. Now, if *the faces of Jehovah* imply each person in the Godhead, *Aleim* must by his own argument imply the same; each person must be *Ale*; all, *Aleim*; and as in *Ezekiel* the ox, the lion, and man, are each called a cherub, it plainly proves the figure of the cherubim to be what Mr. H. makes it.

the Deity, and therefore called *the faces of Jehovah*, the reason of this phraseology will be obvious, as the phrase itself will be significant, to use the words of the late Lord President Forbes, in *some thoughts upon religion*, &c. And the text in *Heb. ix. 24.* above cited, will be strong and full to the purpose, and to the Hebrew word פָּנִי; and expresses Christ's then appearing before the real faces of the *Rubim*, as the high priest, his type, did to the typical faces of the *Che-Rubim*.

And this will shew what the Jews should mean by calling the cherubim *angels of the presence* [or *faces*] of God; if they had any meaning or design, other than to deceive and blind their unhappy followers. For as מֵלָאֲכַי, *melak*, is proved by Mr. H. and now publicly allowed by his opposers, to signify (as the Greek αγγελος) an agent, personator, representative, &c. and פָּנִי, as above, the persons of the Trinity; the angels of the presence or faces of God will be the same as cherubim, the representatives of the persons of the Godhead. *Is. lxiii. 9.* Christ is called מֵלָאֲכַי פָּנִי, *the angel of his* (*viz. God's*) *presence*.

From hence we may interpret many passages of the Old Testament more agreeable to sense, and the scope and honour of the

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 the divine revelation, than has hitherto been
 done; particularly Cain's speech, *Gen. iv.*
14. Thou hast driven me out [Heb. נָרַשׁ, the
 same word as used for expelling Adam
 from paradise] *this day מֵעַל פְּנֵי הָאֲרֶמֶה*,
 translated, *from the face of the earth; and*
from thy face shall I be hid.—Cain could
 not be driven from the earth, that was im-
 possible; but he might be driven or eject-
 ed from the visage of the human figure
 which was in the cherubim, and is here
 joined with, and put before the visages of
 Jehovah; because, as through the humanity
 we could alone approach the divinity, be-
 ing ejected from the face of הָאֲרֶמֶה was
 to be hid from the faces of Jehovah. So
 Christ, as a compound person, is styled in
Cant. v. 10. צֹהַר וְאֶרֶז, white and ruddy.
 Thus the passage is made to speak nothing
 but truth. And accordingly *Gen. iv. 16.*
 Cain went from the faces of Jehovah, the
 cherubim, the place and emblems appoin-
 ted to exhibit their faces or presence.

Several writers have understood *the faces*
of Jehovah as signifying the emblems ap-
 pointed to exhibit their faces or presence.
 “ The name of the church which was be-
 “ fore the flood, is *the face of Jehovah*, (says
 “ one author); and what is said *Gen. iv.*
 “ *14. 16. of the face of the Lord*, that
 “ Cain went out from it when banished,
 “ is

“ is to be understood of the ecclesiastical
 “ censure, of the key that binds, by which
 “ the impenitent fratricide was shut out
 “ of the congregation of the faithful. *The*
 “ *face of God*, in the scripture-phrase, is
 “ the church, in which God manifests
 “ himself, his being, and his will, by the
 “ word and sacrifices as sacraments. When
 “ Cain therefore was commanded to go
 “ out from that presence, he was excom-
 “ municated the antediluvian church.”
 And St. Austin asserts, “ That the visible
 “ sacrifice is a sacrament of the invisible
 “ sacrifice;” and Luther, “ That before
 “ the flood there was a certain fixed place
 “ for divine worship, called the *face of the*
 “ *Lord*.”

Gen. x. 8. 9. Nimrod, the rebel, as his
 name imports, *began to be a mighty one in*
the earth: he was a mighty hunter [or great
searcher] **לפני-יהוה**, *after the faces of Jehovah;*
i. e. in breaking down and destroying these
sacred emblems, so as to become a proverb
or by-word; as Jeroboam did afterwards,
who made Israel to sin, with regard to these
faces:—Even as Nimrod the mighty hunter
[or the great searcher] after the faces of Je-
hovah.

To be a mighty one, **נכר**, in the earth,
 is to be very wicked; as appears by several
 places

places in scripture. It is to set himself up for *him* or *that* which Jehovah in Adam (namely, the man Jesus) could alone, and had promised alone to be.—To be a mighty hunter להנייהוה, of the faces of Jehovah, is to be an apostate from the real and appointed means of salvation, and to be a persecutor of the true, faithful, and stanch believers, that stand up for the the old ways, and the old form of worship, as *Ezek. xiii. 18.* But Jehovah has promised to deliver his people out of such hands.—Some of the fathers and commentators have given the same sense of the passage, namely,
 “ That Nimrod was a deceiver of souls,
 “ and forced men to worship fire ; that he
 “ was not only a mighty hunter in the earth,
 “ but what was worse, against the Lord,
 “ would also govern in religion, be head
 “ and supreme in the church ; that he set
 “ up new modes of worship, usurped the
 “ priesthood by force and sword, was a
 “ general robber of mankind, a persecutor
 “ and killer of good men ; not only an
 “ hunter of hares, stags, and boars, (as our
 “ modern princes, who often follow hunt-
 “ ing with an eagerness even to madness,
 “ so as to neglect their serious affairs and
 “ regal offices for it) ; but hunted men,
 “ especially believers, and the holy pro-
 “ phets ; invaded the people of God, the
 “ then church, and that line of which
 “ Christ

“ Christ was to be born ; built an altar to
 “ the heavens to get him an immortal name
 “ in the world ; and when he saw this
 “ building confounded and hindered by
 “ God, then began to build the city of Ba-
 “ bel, where he established the religion of
 “ Bel or Baal. Sometime after this, Ashur
 “ went out from thence, and built the
 “ city of Nineveh for himself, and trans-
 “ lated thither the empire of the whole
 “ earth. — But upon what occasion or at
 “ what time this Babylon was destroyed,
 “ no where appears. However, Ashur left
 “ the land of Shinaar, because he would
 “ not come into the worship of idols insti-
 “ tuted by Nimrod.”

We may now rescue a text which the
 adversary would rack and torture into a de-
 nial of that doctrine it so easily, naturally,
 and plainly speaks, when left to itself, and
 the natural construction of the Hebrew
 language. The text I mean is the first
 commandment which the Deists and Anti-
 trinitarians have pressed into their service
 by colour of the singular word *God*, inex-
 pressive both in itself, and of the plural
 word *Aleim* in the original, where it runs
 thus.—*I am Jehovah thy Aleim ; thou shalt*
have no other Aleim על פני, *in opposition to me*
[or to my faces], viz. the cherubim ; which,
as before observed, are called the faces of
 Y *Jehovah*

Jehovah, and exhibit the Trinity in Unity, and the man taken into the essence by his personal union with the second person:—so they were to have no other redeemers, consequently no other method or means of redemption, and no other objects of worship (which was the common crime of the nations round about them, and which the Jews themselves were too prone to fall into) but those, and that implied in the word *Aleim*, and exhibited in the cherubim.

Those who think that the knowledge of all things natural and divine lies wrapt up in embryo in the brain of man, and is unfolded by degrees, through the means of education, learning, study, and the kindly warmth of imagination, will not be pleased with the account of so early a revelation to the first man, in *matters* discoverable, as they think, by the light of nature; and about *institutions* which several of our celebrated divines have asserted to be of human invention; misapprehensions, as they conceived, agreeable to the darkness of Pagans, and the simplicity of earlier ages.

But, without enquiring why the brains of our present race of men should be so much better soil, since they are of the same matter, than those who lived five thousand years ago, I shall beg leave to cite the words of
of

of a worthy and eminent divine of our church, against the human invention of sacrifice, and the rites thereon dependent, asserted by Dr. Outram, Dr. Spenser, and others.—“ Now, with all due reverence to
 “ the authority of those great men who urge
 “ it, I can by no means satisfy myself with
 “ the colour they give to their arguments,
 “ from the rude unpolished state of men in
 “ the first ages of the world. This I know
 “ is a notion very agreeable to the Heathen
 “ philosophers and poets, and their accounts
 “ of the original of this world, the progress of knowledge, and improvement
 “ of mankind. And this might probably
 “ agree well enough with that age, when
 “ Abraham and his seed were chosen out
 “ from the midst of a dark and degenerate
 “ race. But whether it agree with the
 “ times of Abel and Noah, and the antediluvian fathers, will bear a great dispute.
 “ We fancy perhaps, that before there was
 “ any written word, all was dark; but there
 “ is no consequence in that. Nor will it
 “ follow, because arts and profitable inventions for the affairs of this life grew up
 “ with the world, that *religion* too was in
 “ its infant weakness and ignorance in those
 “ early days. St. Chrysostom, I am sure,
 “ gives a very different account of the
 “ matter. He says, The communications
 “ of God’s will were more liberal and fre-

“quent then ; that men lived in a sort of
 “familiar acquaintance with him, and were
 “personally instructed in matters necessary
 “and convenient ; much better enabled to
 “worship and serve him acceptably ; and
 “because they did not discharge their duty,
 “and answer their advantages, that he with-
 “drew from this friendly way of conversing
 “with mankind ; and, then, to prevent
 “the utter loss of truth, by the wickedness
 “and weakness of men, a *written word*
 “was judged necessary ; and *that put into*
 “*books, which the corruption of mankind had*
 “*made unsafe, and would not permit to conti-*
 “*nue clear and legible in mens hearts.* In the
 “mean time, the preference he manifestly
 “gives, both for *knowledge and purity*, to
 “first ages ; and compares the patriarchs
 “at the beginning of the world, in this
 “point, to the apostles at the beginning of
 “Christianity, as parallels in the advanta-
 “ges of revelation and spiritual wisdom,
 “infinitely superior to the succeeding times
 “of the church. And it is plain from scrip-
 “ture itself, that Enoch, Noah, and other
 “persons eminently pious, signally reward-
 “ed for it, and inspired with God’s own
 “spirit, were some of those early sacrifi-
 “cers ; persons to whose character the pre-
 “tended simplicity and ignorance of the first
 “ages of the world will very ill agree.”

Thus

Thus far the learned and judicious Dr. Stanhope. By which it appears, that some of the fathers of the church were far from thinking the first man left to reason and his own imagination in so important an affair as that of the worship of God before, and how to work out his forfeited salvation after the fall. "For though reason," as the Doctor well observes, "might convince him, that God was to be worshipped; yet he alone could tell him what worship would be acceptable to him, and by what means he should be saved." And he sums up the general sense of the Christian church, with regard to the divine institution of sacrifice, in these words.

"That almighty God instructed Adam how he would please to be worshipped; and Adam trained his family and posterity, both by example and instruction, in the same solemn methods of serving and addressing God.

"That from the time of a Redeemer's being promised, expiatory sacrifices were both instituted and practised; partly as an intimation to men of their own guilt, and the final destruction they deserved; and partly as a shadow and prefiguration of that vicarious punishment which God
Y 3 " had

“ had promised to admit for the sins of
 “ men, in the redemption of the world by
 “ the perfect sacrifice of his Son.

“ That as no age of the world can be
 “ instanced in, when God did not afford
 “ men some visible signs and sacraments of
 “ his favour, and the covenant between
 “ him and them; so the ages before the
 “ institution of the Jewish law (which
 “ abounded with very expressive and parti-
 “ cular significations of this kind) had sa-
 “ crifices for that purpose.

“ That the Heathen sacrifices were not
 “ pure inventions of men, but corruptions
 “ of a divine institution, which, being
 “ propagated to all the offspring of Adam,
 “ was differently received, and depraved by
 “ the uncertainty of tradition, long tract of
 “ time, the artifice of the devil, and mens
 “ own vicious affections. Of which, who-
 “ ever reads the apologies for Christianity,
 “ will find proofs in abundance; and be
 “ convinced, that the Pagan idolatry was
 “ built originally upon the worship of the
 “ true God, vitiated, and perverted, and
 “ misapplied. For we must in reason be
 “ sensible, that the likeliest and most usual
 “ way by which the devil prevails upon
 “ men, is not by empty and groundless
 “ imaginations, or inventions perfectly new;
 “ but

“ but by disguising and mimicking the truth,
 “ and raising erroneous and wicked super-
 “ structures upon a good and sound bot-
 “ tom.

“ It is therefore, it seems at least,” adds
 the Doctor, “ in my poor opinion, most
 “ probable, that the Jewish ceremonies
 “ were indeed adapted to the Egyptian, and
 “ other Pagan rites ;—but, withal, that
 “ those Pagan sacrifices were corruptions of
 “ the old patriarchal ; not entirely mere in-
 “ ventions of their own, but additions only,
 “ and extravagant excrescencies of error, to
 “ which the truth and positive institution of
 “ God first gave the hints and occasions.
 “ For though it can very hardly be con-
 “ ceived how sacrifices should be of mere
 “ human motion ; yet there is no difficulty
 “ in supposing, that the thing once institu-
 “ ted, and once established, might be abu-
 “ sed and depraved to very prodigious and
 “ abominable purposes ; as it was, no doubt,
 “ very early in that universal degeneracy to
 “ idolatry, from which it pleased God to
 “ rescue Abraham and his posterity.” [*Hoc*
interest inter sacrificia Paganorum et Hebræorum,
 [says Austin], *quantum inter imitationem er-*
rantem et præfigurationem prænunciantem ; that
 is, “ There is as great a difference between
 “ the sacrifices of Pagans and the Hebrews,

“ as there is between an erroneous imitation
 “ and a typifying prefiguration.”]

“ One very remarkable circumstance con-
 “ tributing to the strength of this opinion
 “ is, that almost every where the ceremo-
 “ nies in the act of oblation seem to be very
 “ much alike ; which is very natural to an
 “ exercise and institution derived down
 “ from one common head, and originally
 “ fixed by a positive command ; but scarce
 “ conceivable of an invention merely hu-
 “ man, where men, in all likelihood,
 “ would have run into as great diversity,
 “ and thought themselves as much at liber-
 “ ty, as they do in the affairs of common
 “ life : but especially the sacrificing beasts,
 “ by way of atonement, obtained univer-
 “ sally, and the imagination of their blood
 “ being necessary and effectual for pardon ;
 “ which, I confess, if a dictate of reason
 “ and nature only, is certainly the strangest,
 “ and most remote from any present con-
 “ ceptions we are able to form of the dic-
 “ tates of nature, of any that ever yet pre-
 “ vailed in the world. And therefore this
 “ is scarce accountable for any other way,
 “ than from the promise of a Redeemer and
 “ sacrifice to come, which the sacrifices of
 “ beasts were in the mean while appointed
 “ to represent.”

But

But though the Doctor, and many others, thus strongly and justly asserted the divine institution of sacrificature, and of the other rites typical of Christianity; yet, for want of Mr. H.'s key, they could not decypher their emblematical and hieroglyphical meaning, so not make good their assertions, or shew where and in what manner the scripture had made this revelation of the things, they rightly concluded, from the goodness of the Deity, and the circumstances of man, was agreeable to the attributes of the one, and to the necessities of the other, to be made. Whence loose and lazy thinkers began to imagine, that there was nothing certain revealed about these points in the Old Testament; and that what was said by our divines about them, was rather what they could wish, than what they could prove to be there; so took a proper opportunity and place to make their attacks: which has reduced Christianity to the cool and lukewarm state it is now in; and has given the enemy an opportunity of introducing new methods and means of salvation in the other world, and of gaining preferment in this;—*bath breathed life into the image of the beast;—and caused that no man shall buy or sell, save he that hath the mark, or the name of the beast, or the number of his name.*

How

How glad the learned author above cited would have been of the *key* with which the world is now blessed, and how necessary he judged it, may be collected from the following passage.

“ While my thoughts were upon this
“ subject, it came into my mind, that pos-
“ sibly the tradition of a Redeemer to come,
“ and that God would one day reconcile
“ himself to the world by the sacrifice of a
“ man, and his own Son; that this tradi-
“ tion, I say, darkened, confounded, and
“ perverted by the increase of idolatry, and
“ the cunning of the devil, might be abu-
“ sed to the putting men upon human sa-
“ crifices, and particularly those upon their
“ own children. I know there are other
“ accounts to be given of this matter; and
“ I propose this as a mere conjecture, not
“ otherwise fit to trouble the reader withal;
“ but that, I believe, if strict enquiry were
“ made, it would be found, that most of
“ the Heathen abominations in divine wor-
“ ship were some way or other at a distance,
“ by mistake, imperfect report, perverse in-
“ terpretations, or by some cunning strata-
“ gem of the devil or other, fetched original-
“ ly from the revelations and institutions of
“ the true religion. *And I cannot but think,*
“ *that it would be great service to the truth,*
“ if

“ if the falshoods that have corrupted, and
 “ were set up in opposition to it, *could be*
 “ *well traced*, and *set in the best light* which
 “ this distance will permit. But that must
 “ needs be a very laborious undertaking,
 “ and, where a great deal will depend up-
 “ on *probable conjecture*, will require a very
 “ judicious hand.”

This is now done by our author, the truly learned Mr. HUTCHINSON; and much less *depends upon conjecture* than the Doctor could ever expect; nay, the matter, I may say, is brought to an absolute certainty, at least put beyond any reasonable dispute. Yet, though the good and learned Dr. Stanhope was of opinion, that such a *performance*, well executed, would be of great service to the *truth*, many of our divines, who pretend to as great zeal for Christianity as that Reverend person, receive it with great coolness and indifference, think too little depends upon conjecture, and too much stress laid upon the Hebrew language, though framed by God's direction by perfect man. And the key of knowledge Providence has vouchsafed to give us by *our author* at a time when we most wanted it, is made as light of, and as much neglected, as if the scriptures were not worth the study of our great geniuses, or as if it was of no consequence whether they are explained so
 as

as to be consistent with themselves, with sense and truth, or left, as translated, liable to the idle objections of every smatterer in what is now called philosophy, or each self-sufficient reasoner, who know not a letter of the language in which the *book* is wrote, but found their objections upon the errors of the translations, and their own perverse misapprehension.

Whatever our Right Reverend fathers of the church may think of the matter, sure I am, that supposing man at first left to *reason* and the *light of nature* to hammer out his own notions of God, and beat out his track in the worship of him;—that the Old Testament is silent about the *original of divine worship*, a *future state of rewards and punishments*, and about the *Trinity*, the *grand article of Christianity*;—that in natural accounts it accommodates itself to the understanding of the vulgar:—sure I am, I repeat it, that this has brought Christianity to its present low ebb, and made objections look big and unanswerable, which, when viewed through Mr. H.'s enigmatical glass, appear low, trifling, and unworthy the character their authors had in the world for parts and learning.

Mr. H. also shews, that the *Psalms* were not wrote to describe the actions, or set off the
the

the righteousness and faith of the typical David, who was no otherwise concerned in them than as a type; but to give a perfect description of what Christ, the real *David*, i. e. the *beloved one*, was to BE, DO, and SUFFER: To the end, first, that the humanity might have an exhibition of all things necessary for him to know in his first state, to encourage him in his ministry; being assured, as *Psal.* xv. 5. that *he who doth these things, shall never be moved*: and, secondarily, that the Jews might not rest in the types of an *high priest*, *purifications*, *sacrifices*, *atonements*, and such like; nor trust to a temporal kingdom, things, and actions, and at last expect a *temporal deliverer*: but see that they were only typical, to have an end, and through them look to what was meant and typified by them: and that the Heathens might see, that all their emblems, and emblematical institutions, handed down by tradition, really aimed at describing what Christ did in reality perform, when he came in the flesh: more particularly to Christians, after all was finished, to shew, that every thing Christ *did*, *suffered*, *does*, and is *to do*, was not only predicted, but that they are described in the *Psalms*, and some parts of the prophets, so as to be the glass to exhibit who he was, to review his sufferings, and see his glory, more fully than the writers in Greek could describe,

so

so no need to repeat many of them. And here, in the *Psalms*, men may find the things, &c. it has been objected Christ did and suffered, which are not predictively written of him, and also the things which he refers to, which, for want of understanding the hieroglyphical, emblematical way of writing the scriptures, and the genius of the Hebrew tongue, have been hitherto overlooked. The first *Psalms* indeed points out the intent of all the rest, beginning with “*the blessings, the proceedings or goings on to success or happiness of that person who walked not in the counsel of the ungodly, nor stood in the way of sinners,*” &c. Which is not applicable to David, nor to any mere man. And then it follows in the second *Psalms*, *Why do the heathen rage, and the people imagine a vain thing? The kings of the earth, set themselves, and the rulers take counsel together, against Jehovah, and against his Anointed, viz. this man described above.*—Indeed, as Mr. H. observes, some part of every *Psalms* shews, that a mere man is not the speaker of that which seems to be the man’s part; nay, that it is not spoken about a mere man, nor to a mere man. And if the reader will consult the fathers, he will find, that they in their writings refer almost every *Psalms* to Christ: *Sed et omnes pene Psalmi* [saith Tertullian] *Christi personam sustinent, Filium*
ad

ad Patrem, id est, Christum ad Deum, verba facientem repræsentantes.

He next shews, that the terms *begotten* and *proceeding*, with relation to the *second* and *third* persons of the Godhead, have been the chief occasions of those λογوماχιαι about the Trinity which still disturb the church, by mistaking them to be descriptive of the manner of existence; while they solely relate to the œconomical parts of the divine persons as *Aleim*, which they, by the terms of the *Ale*, the covenant, were each at different times respectively to act. That the idea of the personality and mode of subsistence being settled by the type in the Hebrew scriptures of the Old Testament, the writers in Greek of the New Testament, if the genius of that tongue would have permitted them, had no occasion to repeat it; as having no concern with points already settled, but with what was to be done in consequence of the covenant by those persons of the *Aleim* in Jehovah, whose essence and personality were fixed and determined in the Hebrew by the material type, the one substance of the heavens in the three conditions of *fire*, *light*, and *spirit*, and the parts of the covenant they were each to act, which were fully exhibited in the cherubim. So it was not the business of the New Testament to give the descriptions of the persons,

but

but an account of the completion of what was already described; and shew how the completions in the Greek answered the descriptions in the Hebrew.

Pursuant to the covenant, the *second person* was to take flesh, and to be joined to the humanity, conceived in a supernatural manner without the seed of man, and born with it, the flesh; so, humanly speaking, may, in the same manner as the soul, be said to be begotten, to be a son: for it is as great a contradiction to say the human soul is begotten by a man, as it is to say one of the Essence is begotten by another of the Essence: yet the compound of soul and body, without any impropriety in speaking, is said to be begotten, to be a son. Why then may not the compound person Christ, of a reasonable soul and human flesh subsisting, with a person of the essence joined to him before his birth, and born with his body, be with the same propriety said to be *begotten*, to be a Son?—And as the covenant was made before the creation, the Nicene creed styles Christ *begotten before all worlds*, and not from eternity. It is plain, where *begotten* is once applied to *generation*, it is many times to *change of condition*; as *begotten by faith, by hope, through the gospel, &c.* When the Son had reconciled the Father to men, and had exalted his humanity with him

him at his ascension; according to his promise upon earth, the Son and the Father sent the Holy Ghost to inspire and assist those who were to preach, and establish the church: so the Holy Ghost was sent, and then proceeded from the Father and the Son; as *Rev. xxii. 1.* "He shewed me
 " a pure River of Water of life, clear as crystal, proceeding out of the throne of God,
 " and of the Lamb."

The judicious Mr. Bate, in the *second part* of the *Data*, &c. p. 30. has a critical note well worth transcribing, namely, That
 " there are different words used for the
 " procedure, or coming forth to administer, of the Son and Spirit, before and
 " since the completion of the types. *Ερχομαι* is used for their real coming out
 " since, or at the completion of the types,
 " and *πορευομαι* is used before, *John viii. 42.*
 " *xvi. 28.* Christ, when on earth, says,
 " *Εξηλθον εκ του Θεου, παρα του Θεου, παρα*
 " *του Πατρος.* Speaking of the Holy Ghost's
 " procession, or coming forth at Pentecost,
 " *John xv. 26.* But when the Comforter
 " *ελθη, shall come, whom I will send.* Here
 " *ερχομαι* is applied to their coming forth
 " to perform the grand parts they had undertaken. But as the Church was governed by the same divine persons before
 " the manifestation of Christ in the flesh,
 Z though

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 “ though in a different manner, the other
 “ word is used, chap. xv. 26. *The Spirit of*
 “ *Truth, who* *εκπορευεται*, [not who bath,
 “ or did, or will, but who now] proceeds.
 “ He was then performing his part, which
 “ he is said to come forth to do; but his
 “ coming forth then was not in that man-
 “ ner, or to that degree it was afterwards.
 “ Observe the contradistinction the words
 “ are used in, *But when the Comforter* *ελθῃ*,
 “ *is come, who* *εκπορευεται*, *now* *proceeds*.
 “ So 1 Pet. iii. 19. Christ’s proceſſion to
 “ rule or adminiſter in his part before his
 “ incarnation, *by which* [Spirit] *πορευθεις*,
 “ *proceeding, he preached, &c.* This ſhews
 “ the words relate entirely to *adminiſtra-*
 “ *tion*, not to *manner of exiſtence*. And if
 “ they will prove from ſcripture the *proceſ-*
 “ *ſion* of the Holy Spirit, they may the Son’s
 “ *likewiſe.*”

The Heathen writers uſe *ερχομαι* for the actual deſcent of their deities; as the ingenious Mr. Upton has ſhewn in his truly critical obſervations on Shakeſpear, *ſecond edition*, p. 223. *in notes*, to which I refer. If the reader can be ſuppoſed a ſtranger to this author, he will thank me for bringing him acquainted with a performance ſo excellent in its kind, and ſo timely calculated to put ſome ſtop to that vague and licentious ſpirit of criticiſm, which is lately gone
 out

out into the world, and is making dreadful havock among the sacred, as well as prophane writings.

Ignorance of the Hebrew, and of the hieroglyphical and emblematical method of writing the scriptures, and trusting to the constructions of the apostate Jews, the spawn of those who killed the Lord of life, have betrayed our great men into a notion, that the Old Testament had determined nothing about the *essence* and *personality* of the divine persons; whence they overlooked *them* in the *Old*, where they really were; and sought for them in the *New*, where they were not: and finding the œconomical terms *begotten* and *proceeding* applied to Christ and the Holy Spirit, they took them for definitions of their manner of existence in the Godhead; and also meeting with these terms used by the fathers, &c. they concluded, that those antient writers had applied them to the *second* and *third* persons in the same sense with themselves; so explained our creeds by their own notions, and defended their notions by our creeds.

To say that the evidence for the doctrine of the Trinity, so for Christ, is contained in the New Testament, is to put arguments into the enemies mouths: for the same record could not contain both the *descriptions*

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 and *completions*, because it was the evidence
 which was to determine men about these
 points. This is to make it evidence of it-
 self; to make Christ bear witness of him-
 self; and we have his own words, that such
 witness is not true or legal, *John v. 31.*
 This is directly contrary to the method
 Christ took.——He constantly referred
 them to the scriptures of the Old Testa-
 ment for evidence of himself: *Search the*
scriptures, for [or because] in them ye think
ye have eternal life, and they are they which
testify of me, *John v. 39.* And after his
 ascension he tells his disciples, *Luke xxiv. 44.*
 that every thing he did and suffered, was
 written in *Moses, the Prophets, and Psalms;*
 so in them were the marks whereby men
 should know whether *he was the Person that*
should come, or they should look for another,
Matth. xi. 3.

Is not this sufficient authority to deter-
 mine men to seek for these descriptions
 there? And as his being a *Person of the Es-*
sence, so of the *Trinity,* was a chief point,
 it must be in the Hebrew scriptures; be-
 cause, as nothing was wanting which hell
 or the Jews could suggest, they then, and
 men since actuated with the same spirit of
 antichrist, would have charged Christ with
 proving himself, from his own evidence
 solely, to be *that person of the Essence and*
man,

man, the Θεανθρωπος, whom every one who came in was to find described for himself from the original records.

But taking it to be the great business of the New Testament to prove, that Christ is really the *person who was to come*, by shewing him to have all the particular designations set down in the Old Testament, which particular designations were set forth to prevent any impostor from imposing himself upon mankind; and finding, upon examination, that every thing relating to the *nature, office, and sufferings of Christ*, is circumstantially described in the Old Testament, and these descriptions fully answered in the New Testament; it affords the strongest proof that the head could *devise*, or the heart of the most scrupulous man could *desire*, of the truth of the points contained in both.

The term *Son of God* has hitherto been taken by our divines as a title of the second person, or divinity, and *Son of man*, of the humanity of Christ. But, according to Mr. H. they signify the reverse. In consequence of the covenant, (says he), the man by being begotten by, and taken into the Essence, became the *Son of the Essence*, of God; as Adam was made by, so while perfect the *son of God, who is the figure of him that*

was to come. One of the Essence, by being taken into the man, became the *son of Man*. As the man Jesus by this union was made the *Son of God*, so God, that person we call the Son, was made the *Son of man*: And so he mostly calls himself.——See *Matth. ix. 6. Mark ii. 10. Luke v. 24. John iii. 13. v. 27. vi. 62.*

And indeed, if we duly consider, and fairly state the case, we shall find good reasons to support this sense of the term. For as the *second person* in the covering of man stood in the stead of man, and bore the punishment due to all mankind, the title *Son of Adam*, or *man*, was proper to him upon that account, as being peculiarly adapted to the condition, the divinity, in consequence of the covenant, and his taking flesh, was in, and strongly expressive of what he was to be for man. And this will be only applying the term, *Son of man*, in the same manner as Christ is called the *Lamb*, and the *passover*; as being in reality what they typified. And this will make *Son of man* the same as **אלוה** in Hebrew; which is a title of the *second person* in the Old Testament; and signifies the *execrated one*, the person *who was to bear the אלה, the curse, the wrath*, which man should have borne: and as this **אלוה** is said to be Jehovah, *Psal. xviii. 32. Is. xlv. 8. Who אלוה besides Jehovah!*

bovab! it puts it beyond dispute, that *Alue* is a title of the divinity.—A son of Adam is a son of wrath, an execrated one, or one liable to the curse of God. By our natural birth we are all sons of Adam, as *Gen. v. 3.* in his image, so under the curse. As Jehovah became *מלך* for us, and stood in our stead, he thereby became *son of Adam*, of *man*, that he might regenerate, and make us sons of God. It is Jehovah, the divinity, the Lord from heaven, who became *our second Adam*, or Son of man, as *1 Cor. xv. 47.* And it is as plain, that the humanity, the flesh of Jesus, then first conceived by the supernatural means of the *Πνευμα Αγιον*, and the *δυναμις * Υψιστος*, [*the Holy Ghost, and the power (or powerful one) of the Highest, viz. the second person of the Trinity*], is called the *Son of God*; as, *Luke i. 35.* *The Holy Ghost shall come upon thee, and the power of the Highest shall overshadow thee; therefore also that holy thing which shall be born of thee, shall be called the Son*

• The writers in Greek of the New Testament, after the manner of the Hebrew, use words for power, &c. personally, or for persons who had power. That *δυναμις* is so used, is put past dispute by *Acts viii. 10.* where Simon is called *η δυναμις της Θεου μεγαλη*; which, by the way, shews that men were in expectation of the coming of *this great power of God*. And I think *εξουσια* is so used *Matth. ix. 8.* where, upon Jesus curing the paralytic, and forgiving his sins, the multitude marvelled, and glorified God, for giving *εξουσιαν τοιαυτην* to men; that is, *the person who had in him such power.*

of

of God.—So that there is very little room, if any, to doubt of Mr. H.'s construction of the terms, *viz.* that *Son of Man* is the *divinity*, and *Son of God* the *humanity*, of the compound person Christ.

As the notion of the *eternal generation* of the Son, and *eternal procession* of the Holy Ghost, has been the origin of most of the absurdities fastened upon the doctrine of the *Trinity*; so the mistake about the terms, *Son of God*, and *Son of man*, has helped to rivet them the faster, and bound our learned expositors in chains of their own making. And while it put our orthodox defenders under such difficulties to maintain their ground, it may, at the same time, have been the fatal cause of deluding the *inquisitive adversary* into those dangerous antichristian errors, upon which they have risked their own and others salvation.—Whoever will read the scriptures upon Mr. H.'s plan of interpretation, will see into what gross mistakes *one* of our most *famous writers* against the *Trinity* has fallen, and what miserable work he has made with *plain Texts*, for want of a little more knowledge of the spirit of the scriptures, and the manner of wording, and hieroglyphically representing that grand affair; “a doctrine which he owns to be of the greatest importance in religion, and which ought to
“ be

“ be examined thoroughly on all sides, by
 “ a serious study of the whole scriptures.”

The Doctor, in that celebrated piece, makes the words of scripture more insignificant than those of any idle author he has criticised upon. For to assert that Θεός in one place means the *supreme God*, in another a *derivative God*, is really treating *holy writ* in a manner no one ever treated any profane human writing.—If three persons were said to be *Adam*, men; each would be looked upon to have an indisputable right to every individual essential property of human nature; and in whatever sense any one of them was said to be *Adam*, each would be so. Yet they might each act different parts in any œconomy, and agree to be called by different names of that œconomy, without altering their natures.—So if three are called Θεός, each surely must be Θεός, in the same sense any one is; though they may have different names of œconomy, as *Father*, *Son*, and *Holy Ghost*, without destroying the essentiality of Θεός: and if one who was Θεός was to be joined to man, then the word Θεός may often denote that person of the Deity so joined to man; and if that divine person begat the manhood, and raised him from the dead, he may in a peculiar sense be said to be the *Father of the manhood*, so *his Father*,

to

to be greater than he the humanity; and the *humanity*, as a joint person with *him the divinity*, may say, *I the humanity, and my Father, the divinity, are ev, one thing, or &c.*—Without this necessary distinction, the meaning of many texts, some spoken of the *divinity*, some of the *humanity*, and some of the *compound* person, may be mistaken and confounded.—Texts spoken of the *humanity* may be falsely applied to the *divinity*, so the texts which prove the *divinity* will be explained away by those which speak solely of the *humanity*; and the *divinity* of the *Son* may seem to be dependent, by not considering, that the second person of the *Trinity* had agreed and allowed, that *that* part of *their* power which they term *superiority*, was to be exercised by the first person; and that he the second was become a compound person, a servant for the time, so had not, could not have his original titles; and that the superiority to one, and the titles given to each person, arise, not from his power or dominion, but from mutual consent, that their power was to be exercised sometimes by one, sometimes by another, though each could not transfer his essence to another. Particularly they confound themselves and others, in not distinguishing when the term *Father* is the *Essence*, when a person of the *Essence*; and thereby make many false quotations,
wrest

wrest many of those cited, and omit texts in the New Testament most to the purpose.

If I am asked, How our great men could possibly overlook these points, which Mr. H. would insinuate, nay, asserts, are so plainly and clearly revealed in the Hebrew scriptures? I must answer, with him, That most men have hitherto sought for the original *descriptions* of *persons* and *things*, either where they were not to be found, or to find them where they were, in other manners than they were there described; in *letters*, when there was nothing but *hieroglyphics*, *emblems*, and *types*; or in a *literal description*, where most of them were *ideal*. But they have chiefly been misled by following the directions and constructions of the enemies of men, the apostate Jews, who have deceived them in the very nature and genius of the language, as if its words, like those of the other confounded tongues, signified *several*, whereas they are only intended to signify *one idea* in several things.

I am sensible, that the unsatisfactory explanations (if I may without offence so say) of our orthodox hitherto, for want of the knowledge of the *type*, though otherwise great, good, and learned men, with the great cry of victory on the side of the adversary

versary, may have almost tired men of all ranks and degrees of condition and understanding, from looking into these matters: yet if they will become acquainted with Mr. H. they will, to their inexpressible satisfaction, both as *Christians* and *men of sense*, find the scriptures made one, uniform, compleat system of theology and philosophy, consistent with themselves and nature; and the several words of the greatest import to the Christian religion, construed according to the natural usage of the Hebrew language, which from ideas taken from nature, distinguish the *essence*, the *persons*, their *offices*, &c. without any contradictions or inconsistencies.

I have now complied with the desire of my friends in the publication of these sheets, and shall leave them to take their fate; being desirous of employing the remainder of my days, which I cannot expect to be many, in something better than fruitless altercation.

12 JY 62

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NOTE to be put to Page 115, Line 21, 22.

By the Light *springing up* Heb. **זורה** I would understand the Light that is diffused upon, or covers that Part of the Earth; and would make it, in the Text above, the Participial Noun to **שואף**, as a descriptive Word for the Light which is shining there, and admitting or drawing in the Spirit by its extraordinary Quantity at this Station or Place. For the precise Meaning of **זורה** seems to be the *Covering over*, or *coming over* the Face of the Earth; as the Leprosy 2 Chron. xxvi. 19. **זרחה**, *came over* the Forehead of Uzzah, or spread itself upon it.

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plate 1

Fig. 1



Fig. 2

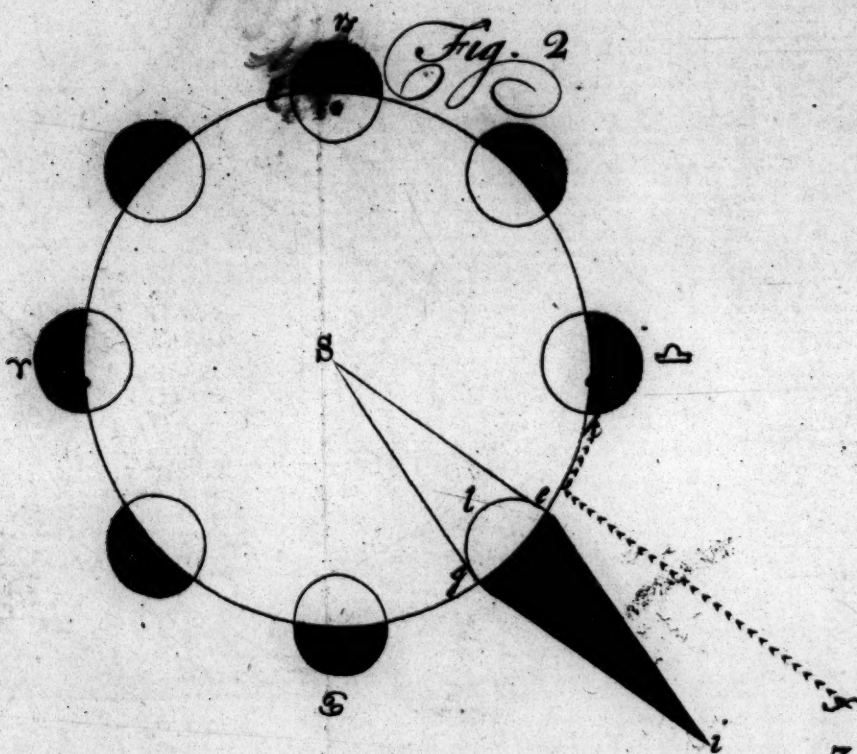
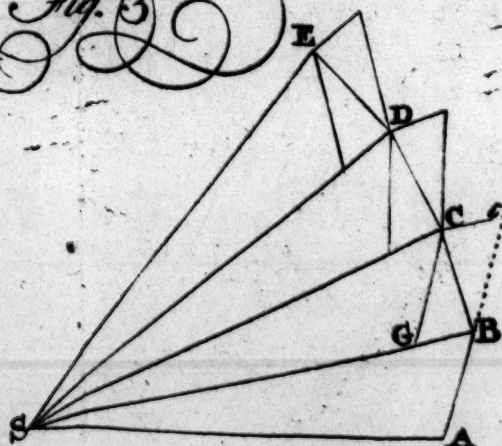
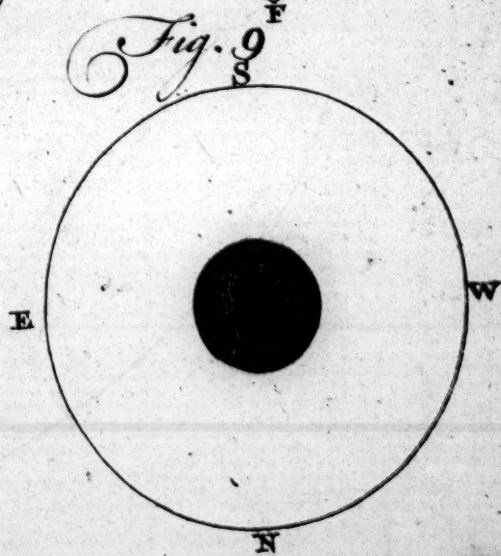
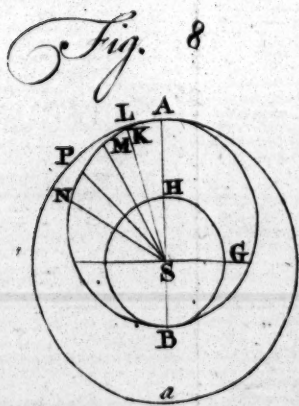
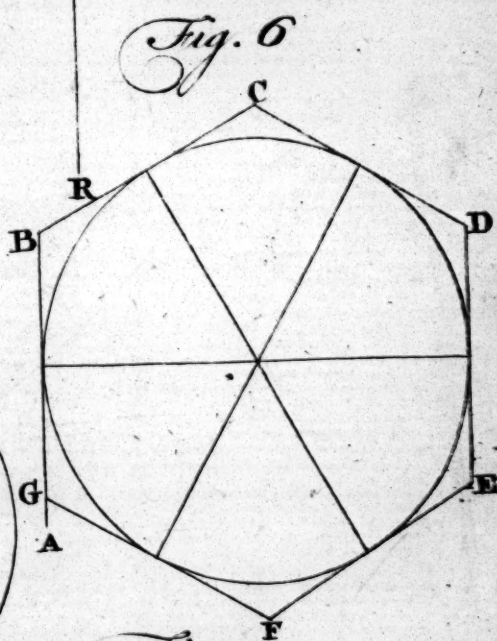
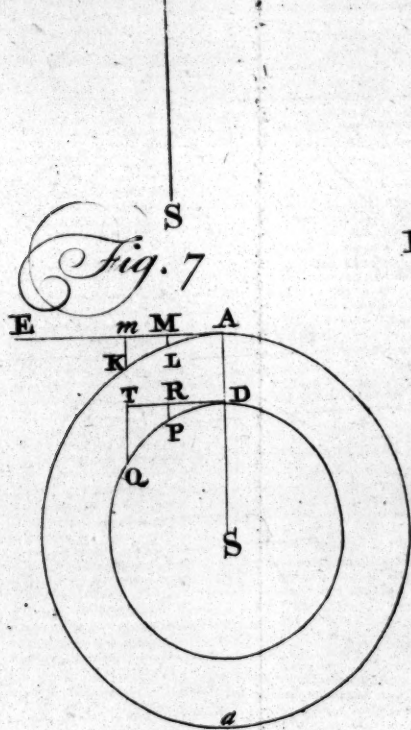
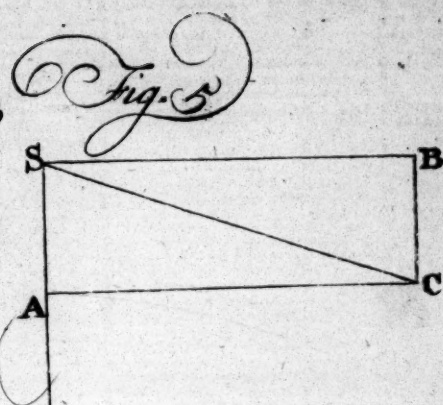
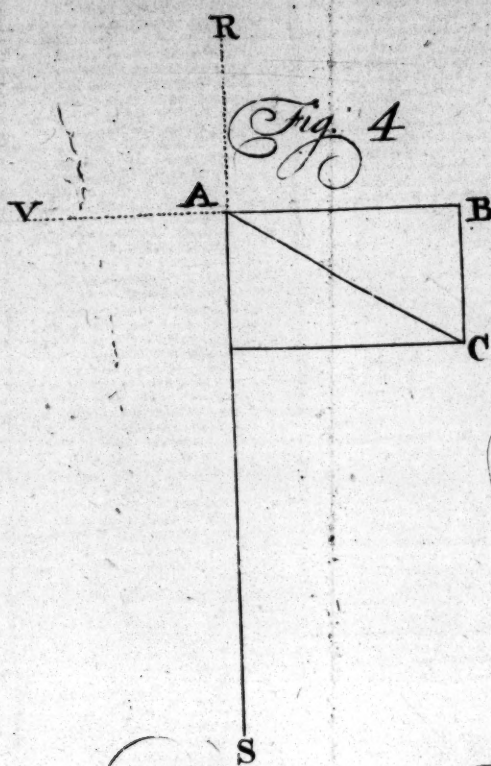


Fig. 3







Platz 3

Fig. 10



Fig. 11



Fig. 12

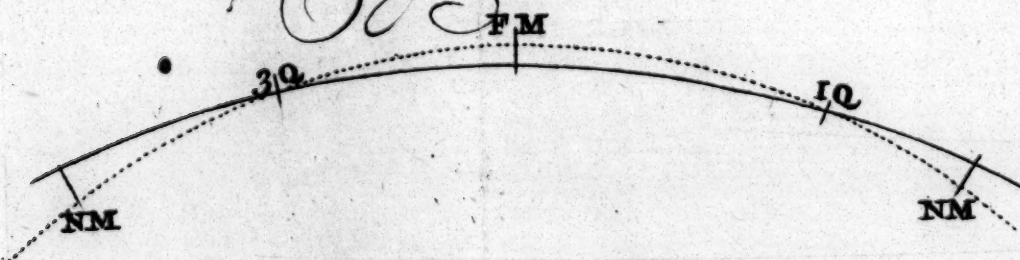


Fig. B

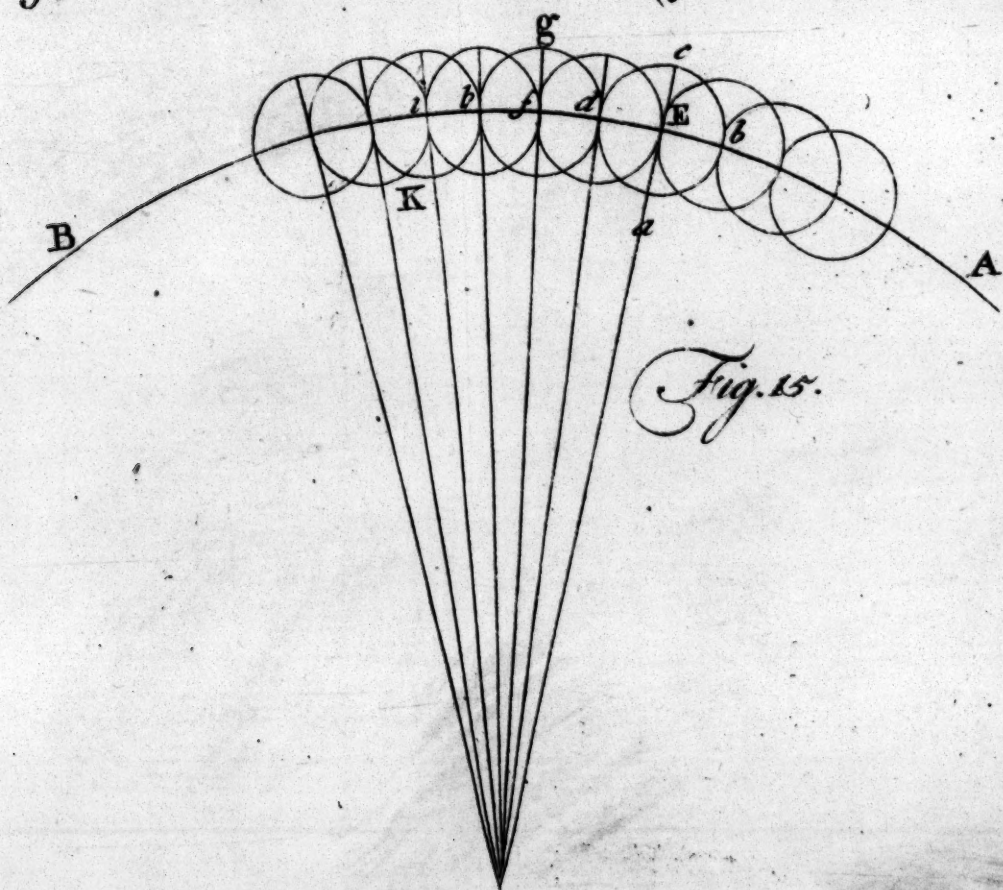
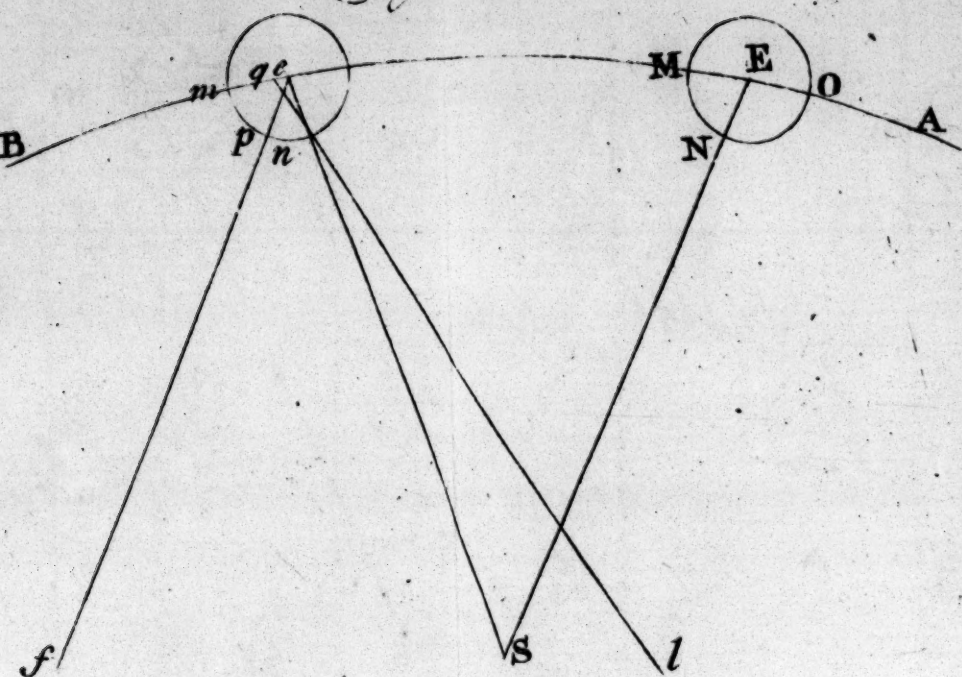


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Fig. 14.



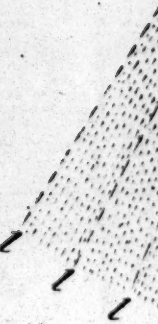
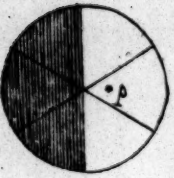
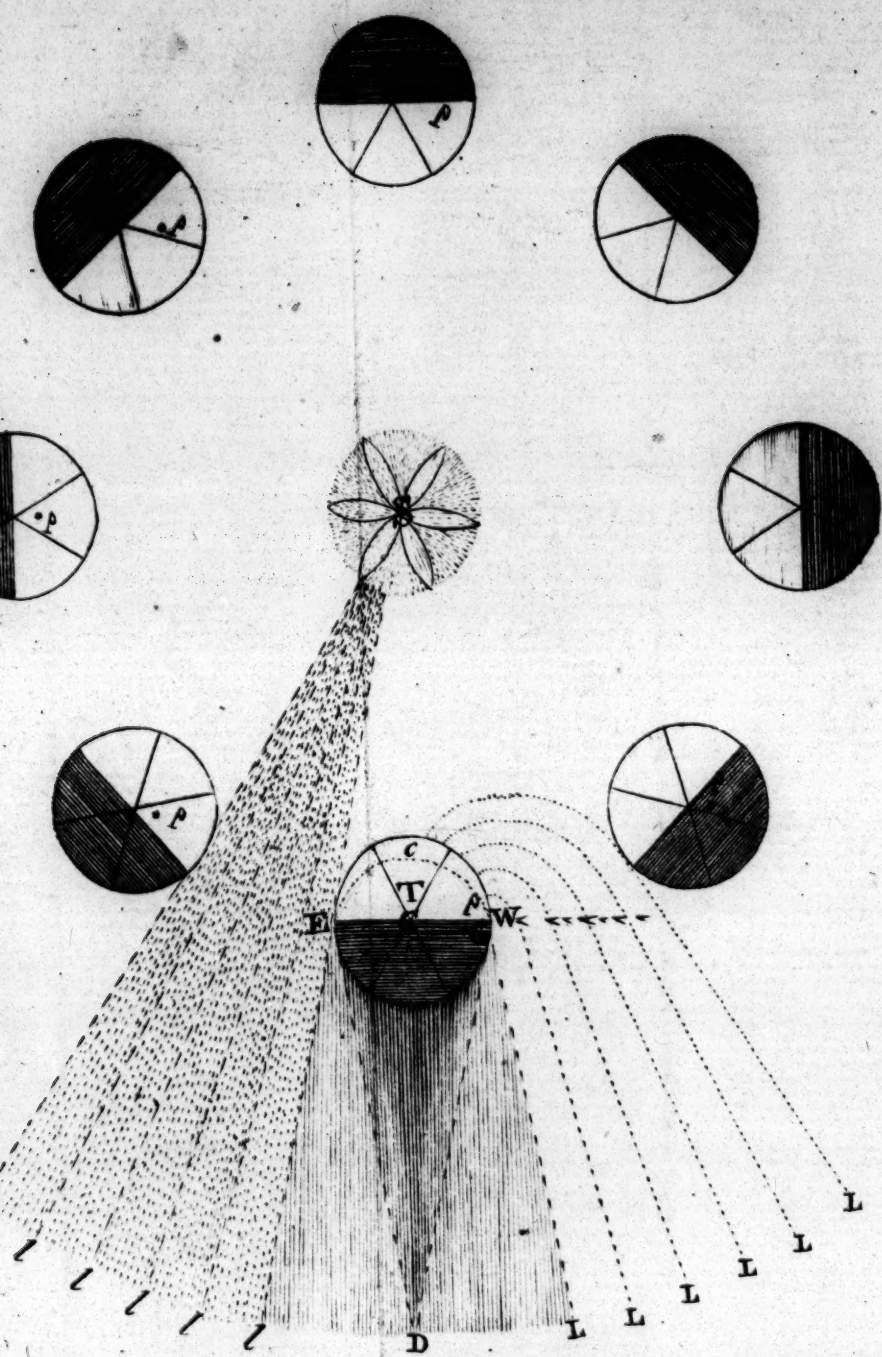


Fig. 10 *Plate 5*



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plate 6

Fig. 17

C	H	G	F	E	B	D
Red	Orange	Yellow	Green	Blue	Purple	Violet
appears from this from this from this from this from this from this from this	from C to D	from D to G	from G to F	from F to E	from E to B	from B to D
That of the of the of the of the of the of the of the	That of the of the of the of the of the of the of the	That of the of the of the of the of the of the of the	That of the of the of the of the of the of the of the	That of the of the of the of the of the of the of the	That of the of the of the of the of the of the of the	That of the of the of the of the of the of the of the
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						re